MARINE REVIEW.

VOL. XVI. CLEVELAND, O., NOVEMBER 18, 1897. No. 21.

Department of Commerce.

The establishment of a department of commerce would not involve any new functions of government. It would consist of certain bureaus detached from departments of the government with which they now have no co-ordinate relationship. The additional expense incurred would be mainly that due to the salaries of the secretary of commerce and of his immediate assistants. The following offices should be transferred from the incongruous and overloaded treasury department.

1. The bureau of statistics, which is nothing more nor less than a bureau of commercial statistics.

2. The life-saving service. This bureau attends to rescuing life and property in the case of wrecks, and is naturally an adjunct of commerce. It has no co-ordinate relationship to the treasury department.

3. The bureau of navigation, which in all its operations is related to maritime commerce.

4. The office of steamboat inspection, which has to do with the protection of life and property on steam vessels, and exercises important functions of a police nature.

5. The lighthouse board, whose function it is to guide the mariner on his way by means of lighthouses, lightships, buoys, beacons, fog horns and bells.

6. The United States coast and geodetic survey, whose chief function is to determine the hydrography of our coasts, bays and rivers for the benefit of commerce.

7. The marine hospital service, which exercises its power of quarantine over the vehicles and routes of commerce.

In the war department there appears to be but one office which could properly be attached to the new department of commerce, viz., the office of the chief of engineers. This office, imperfectly designated by its title, is properly an office of public works. It is charged mainly with the duty of surveying rivers and harbors with the view to their improvement; of devising plans for improvements after congress has made the necessary appropriations, and of administering the work of contracting for and executing such work under proper engineering supervision. Civil as well as military engineers are employed in this service. The office appears to be lacking in provision for the exercise of administrative judgment touching the relative commercial needs which are to be subserved by the appropriation of money by congress. This responsibility now devolves mainly upon the committee on rivers and harbors of the house of representatives, and the committee on commerce of the senate. Of course, political as well as economic and commercial considerations have weight in the determination of the almost innumerable questions as to the amounts which shall be expended in the several states and congressional districts. How far this should be modified by devolving such responsibility upon an executive office as well as the question as to whether the enlarged function could or could not be better performed under the war department or under the proposed department of commerce are matters to be determined by congress. I am not prepared to express a decided opinion upon these questions without making a careul investigation of the subject in all its executive and administrative features.

The interior department is the hodgepodge department of the government. It has to do with public lands, patents, pensions, Indian affairs, education, Pacific railroads, geology and census. A more heterogeneous set of functions it would be difficult to imagine. Only three of the bureaus of the interior department, viz., the geological survey, the census office and the office of the commissioner of railroads could with advantage be transferred to the proposed department of commerce. The transfer of the first two admits of doubt, which must be determined by congress. If a department of mines should ever be created, the geological survey would naturally be assigned to it.

The United States commission of fish and fisheries is now a detached office. It would probably find a proper home in the department of commerce.

The bureau of American republics has a certain connection with the department of state. It "was established for the prompt collection and distribution of commercial information concerning the American republics," and it "is sustained by contributions from the several American republics in proportion to their population."

It would seem that the proper connection of this bureau would be with the proposed department of commerce.

The intercolonial railroad commission, now an independent office, should undoubtedly, if continued, be connected with the department of commerce.

The interstate commerce commission is a quasi-judicial body, but exercises important executive functions in regard to the regulation of the internal commerce of the country. It is not as fully charged with the duty of collecting information in regard to commercial movements and commercial conditions as the exercise of its present functions seems to demand. If it shall be decided to make the interstate commerce commission a branch of the proposed department of commerce, it seems to be advisable to associate with it a bureau of internal commerce.

The subject of a department of commerce has been so thoroughly discussed during the last twenty-five years, that I believe the people of this country are overwhelmingly in favor of the establishment of such a department.—From a paper read by Joseph Nimmo, Jr., before New York Board of Trade and Transportation.

Army and navy charts for the lakes are kept in stock by the Marine Review, Perry-Payne building, Cleveland.

Liquid Fuel vs. Coal in Duplicate Torpedo Boats.

The annual report of Engineer-in-Chief Geo. W. Melville of the United States navy again summarizes the conclusions of the department regarding liquid fuel. Commodore Melville says:

"The advantages to be derived from the use of liquid fuel instead of coal for certain classes of ships are so great that nearly every naval power has devoted considerable attention to the subject, and has conducted experiments with a view to determining the best apparatus and the necessary conditions. Our country being the greatest producer of petroleum, it is only natural that the subject should have received attention from this bureau, and from 1867 to the present time the bureau has, at intervals, conducted experiments with various forms of apparatus and various kinds of fuel oil, the last having been noted in its report of last year. An experiment on a larger scale has also been authorized by the department, which, on the recommendation of this bureau, has made a contract for one of the new torpedo boats to be fitted for burning fuel oil. An exactly similar boat, building by the same contractors, will burn coal, so that an excellent opportunity will offer for a comparison of the two fuels.

"That fuel oil has not hitherto been used for naval purposes is due to the items of cost and difficulty of purchase, except in a few localities. On the Caspian sea, where petroleum refuse is plentiful and cheap, it has been in successful use for more than fifteen years. Experiments made about ten years ago by the Pennsylvania Railway Co., under the direction of Mr. Theo. N. Ely, chief of motive power, showed the entire practicability of burning 'reduced oil,' but the question of cost made its use, except in special cases, impracticable, as well as the fact that this railway, if using oil fuel to the exclusion of coal, would at that time have consumed more than one-third of the entire output of petroleum in the United States. It is therefore quite evident that, as far as can now be seen, there is no prospect of the use of fuel oil in replacement of coal on vessels employed in general cruising. Inasmuch, however, as the traditional policy of our navy has been a defensive one, it is probable that our torpedo fleet would operate on our own coast only, so that if we can afford the cost we might readily adopt oil fuel for this class of vessels if, in extended practice, it proves as successful as the experiments lead us to anticipate.

"The petroleum refuse or 'residuum' already referred to (which closely resembles the 'reduced oil' of the Pennsylvania railway experiments) has been tested so thoroughly that we are able to calculate the effect on radius of action of its use instead of coal. Its evaporative power is from 1.5 to 1.7 times as great as that of coal, and it can be 'pulverized' or 'atomized' with either compressed air or steam. The use of the latter is the simpler, but involves an extra supply of fresh water to replace that spent in the pulverizers. However, in good forms of apparatus this amount is less than 2 per cent. of the steam vaporized. A simple calculation will show that in one of our first-class torpedo boats, if enough space be reserved for fresh water to supply the amount lost in pulverizing the residuum, there can still be carried an amount of the latter more than equal in evaporative effect to the total amount of coal now carried. Inasmuch, however, as an evaporator must in any case be supplied for ordinary losses, the simplest way to secure the needed fresh water would be by an increase of evaporator power, with, perhaps, a small reserve tank of fresh water for use at maximum power. If compressed air be used, the weight would probably be less, but the machinery would be more complicated.

"The advantages of fuel oil are: Greater evaporative power for same weight and bulk; ease of manipulation; perfect control of the combustion to suit the requirements of service; rapidity of starting fires; cleanliness; absence of refuse and the necessity for disposing of it; smaller personnel required in fire rooms, and (if it were in general use) ease and cleanliness in receiving and stowing on board. Against these advantages there are the disadvantages, if residuum is used, of cost (if adopted to a great extent), difficulty of purchase away from our own coasts, and (unless used to a great extent) some trouble in receiving on board. If other forms of fuel oil are used, some of these might be obviated, but the question of danger would arise. The balance of advantages is so great where the use of fuel oil is at all practicable that, in the bureau's opinion, the department is fully justified in authorizing the experiments already provided for and any others which will tend to the early practical use of this form of combustible on our torpedo boats and other small vessels."

Suggestions Regarding Fog Signals.

Commander Folger, U. S. N., of Detroit sends to Capt. Geo. P. McKay of Cleveland a suggestion regarding fog signals for the lakes. As the vessel masters of the lakes spent a great deal of time over the question of fog signals in the "White law," now in force on the lakes, and as they were greatly opposed to anything in the way of a complicated system of signals, it is quite probable that they would not take kindly now to a suggestion involving change of any kind in the present law. Commander Folger's suggestion may bring out a discussion, however, and it is therefore printed. He says:

"The law prescribes that vessels in a fog shall blow three blasts at stated intervals. I wish to suggest that vessels bound up shall (with these three blasts) blow one long and two short thus — — —; vessels bound down to blow two short and one long, thus — — —. There will thus be one more doubtful element eliminated. I think there can be no confusion, as vessels are (except in crossing Lake Michigan) always going at least partially either up or down. If crossing Lake Michigan on a course directly perpendicular to the axis of the lake they can make the blasts of equal length, which will likewise be, in their special case, an indication of their course. For vessels overtaking other vessels, this would be especially advantageous."

Our Ship Builders.

FIFTH ANNUAL MEETING OF THE SOCIETY OF NAVAL ARCHITECTS AND MARINE ENGINEERS—INTERESTING PROFESSIONAL PAPERS—STIRRING ADDRESS BY ASSISTANT SECRETARY OF THE NAVY, THEODORE ROOSEVELT.

New York, Nov. 12—The fifth annual meeting of the Society of Naval Architects and Marine Engineers, which concluded with a banquet at Delmonico's this evening, was well attended and in all respects a successful gathering. Through the courtesy of the American Society of Mechanical Engineers, the meetings were again held in the quarters of that organization, No. 12 West Thirty-first street, the sessions continuing through Thursday and Friday. In the absence of the president, Clement A. Griscom, one of the vice-presidents, Charles H. Cramp, of Philadelphia, called the meeting to order and Mr. John C. Kafer of New York was made chairman. The first act of the society was the adoption of resolutions thanking the British Institution of Naval Architects for the hospitality lavished on delegates from this country who attended the International Congress of Naval Architects and Marine Engineers, held in England in July last in connection with the celebrations attending the diamond jubilee of the queen's reign. It was agreed that a suitably engrossed copy of the resolutions should be sent to the British institution through its president, the Earl of Hopetoun. Another resolution expressing the society's appreciation of the chivalrous character and knightly loyalty of the late Admiral Richard W. Meade, who was a vice-president of the society, was adopted by a standing silent vote. Of the late Admiral Meade the resolution said: "He had brilliantly filled all positions in the navy with honor and ever aimed with jealous tenacity to defend, afloat and ashore, the honor and dignity of the land. He honored us by acting as one of the vice-presidents of this society, and had, both through written articles and executive talent, done much to advance the development of the science of naval architecture and its interests."

Quite a large number of active, associate and junior members were taken into the society by a unanimous vote, and new officers were then elected for the ensuing year. Clement A. Griscom of Philadelphia was re-elected president. Commodore Bunce of the United States navy was chosen to succeed Admiral Meade in the list of vice-presidents. Gen. T. W. Hyde and E. A. Stevens were elected vice-presidents. W. M. McFarland and C. H. Peabody were added to the council, and Francis T. Bowles was re-elected secretary and treasurer. In accordance with these changes, the list of new officers is as follows: President, Clement A. Griscom; secretary-treasurer, Francis T. Bowles, U. S. Navy, No. 12 West Thirty-first street, New York; vice-presidents, F. M. Bunce, Charles H. Cramp, Philip Hichborn, Charles H. Loring, T. W. Hyde, William H. Webb, George W. Melville, George W. Quintard, Irving M. Scott, E. A. Stevens and Frank L. Fernald; members and associate members of the council, Francis T. Bowles, French E. Chadwick, Washington L. Capps, James E. Denton, William F. Durand, Edward Farmer, H. T. Ganse, Nathaniel G. Herreshoff, William H. Jacques, John C. Kafer, Frank B. King, Frank E. Kirby, W. M. McFarland, Jacob W. Muller, Lewis Nixon, John F. Pankhurst, C. H. Peabody, Harrington Putnam, William T. Sampson, Horace See, E. Platt Stratton, Stevenson Taylor and George E. Weed.

The papers, extracts from some of which have already appeared in the Review, were all at hand excepting that of Edwin S. Cramp of Philadelphia—"Performance of Scotch Boilers and their Durability under Forced Draught." Mr. Cramp was unavoidably absent and was also unable to prepare the paper that was expected from him. At two sessions on Thursday, the papers were as follows: "Watertight Bulkhead Doors—Long-Arm System on the U. S. S. Chicago," by Wm. Barnum Cowles, Esq., member; "Regulations for Loading Vessels," by Lewis Nixon, Esq., member; "Torpedo Boat Design," by Ass't Naval Constructor H. G. Gillmor, U. S. Navy, associate; "The Commerce of the Great Lakes," by C. E. Wheeler, Esq., member; "Progressive Trials of the Guardian," by Prof. C. H. Peabody, member; "An Experimental Study of the Influence of Surface upon the Performance of Screw Propellors," by Prof. W. F. Durand, member.

When the paper on "Torpedo Boat Design," by Asst. Naval Constructor H. G. Gillmor was under discussion, Mr. A. F. Yarrow, head of the firm of Yarrow & Co., English torpedo boat builders, who was present, addressed the society upon request of the chair. He said:

"We have great difficulty in arriving at a conclusion as to the value or capacity of torpedo boats, on account of the absence of a definite standard and the difference in conditions under which trials and tests have been made. In the development of the ideal torpedo boat in the various points of construction, there is no doubt but we have found water tube boilers to be superior to the locomotive boiler. It is also a fact that the elastic portions of boats should not be joined directly to the hard plates, but that the change from rigidity to elasticity should be gradual in order to obtain the best results." Mr. Yarrow said that a torpedo boat built by his firm for the Chilian navy crossed the ocean, a distance of 11,000 miles, under her own steam, without replenishing her coal bunkers. The trial test of the boat for the government was made two days after her arrival in a Chilian port, before her boiler was cleaned. She stood the test in a most satisfactory manner. He thought a little speed might be sacrificed to safety by increasing the thickness of the shell to ½ inch which would be sufficient to resist rifle bullets. The shell at present, he said, is usually about 3-16 of an inch. To increase it to ½ inch would cause the boat to lose a half knot or perhaps a knot an hour. He was not altogether sure, he said, that a little additional speed was worth the cost of securing it. It increased the cost of a torpedo boat 50 per cent. to make the speed 30 knots an hour instead of 27 knots; or in other words, three boats of 27 knots speed can be built for what it will cost to build two that will go 30 knots an hour. The society showed its appreciation of Mr. Yarrow's presence by generously applauding him when he rose to speak, a distinction shown to no other speaker during the day.

Col. E. A. Stevens was accorded the honor of presiding at the opening of the sessions for the reading of papers on Friday. The attendance was somewhat larger than on Thursday, several members having arrived too late to take part in the first day's proceedings. The papers were as follows: "Some Notes on the Speed Trials and Experience in Commission of our New Battleships," by Chief Constructor Philip Hichborn, U. S. Navy, vice-president; "Use of Water Ballast for Colliers in the Pacific Coast Trade," by Wm. P. Frear, Esq., member; "Estimated Weights of Machinery," by Prof. Geo. R. McDermott, member; "Navy Yard Expenses," by Naval Constructor W. J. Baxter, U. S. Navy, member; "Pneumatic Steering Gear as Applied to the U. S. Monitor Terror," by H. A. Spiller, Esq., member.

OUR 10,000-TON BATTLESHIPS.

Chief constructor Hichborn's notes were about the four battleships of over 10,000 tons now in commission. These are the Indiana, Massachusetts, Oregon and Iowa. The first three named are of the same class, and the first two, being by the same builder, are practically identical. The vessels are all practically of 10,250 tons displacement and 24 feet draft. The indicated horse power and speed, as reported from speed trials, are: Indiana, 9,738 I. H. P. and 15.55 knots; Massachusetts, 10,403 and 16.20; Oregon, 11,111 and 16.79; Iowa 12,105 and 17.09.

"The predominant opinion among our naval officers who have had experience with these vessels," says the chief constructor, "is that a trial speed of 16 knots is sufficient for our battleships under present conditions, and will not need to be materially increased until foreign battleships promise greater speeds than they now reach, and that the policy which the navy department has followed from the first with these battleships, namely, to give them offensive and defensive power sufficient to enable them to cope with those of any foreign country, without insisting on giving them the speed or carrying the amount of coal and supplies which the circumstances of various foreign navies render desirable, thus making our ships materially smaller and less costly than they would otherwise require to be, is correct. I do not wish to be understood as stating that our battleships are perfect, or that in our experience with them so far there have not been troubles and difficulties and minor accidents of various kinds. It should be remembered, however, that these were the first battleships designed or built for our navy, and I do not hesitate to state that they are vessels concerning which no one who has any connection with them has cause to be ashamed. I may mention as perhaps the most serious accident which has occurred on any of these vessels, the breaking adrift of the unbalanced forward turret of the Indiana in a very heavy gale about a year ago. The revolving weight of this turret is about 489 tons, and its center of gravity is about 3½ feet from the axis of rotation. The conditions and circumstances were such as to call for the display, in the highest degree, of what the builder of the Indiana has characterized as 'battleship seamanship,' and I believe the difficulties on that occasion were grappled with and overcome promptly and fearlessly.

"The behavior at sea of the Indiana class has been all that could be expected, from vessels of that type. Owing to their comparatively low freeboard, they are wet in heavy weather, but they have rarely encountered weather conditions sufficient to interfere with the manipulation of their guns. As a general rule, they have been remarkably steady, but, as was to be expected, there are possible conditions of sea which make them roll heavily. They were originally designed to have bilge keels—the value of bilge keels to check heavy rolling being well known; but when it became evident that docks adequate to take in the vessels with bilge keels would not be completed as soon as the vessels, it became necessary to leave the bilge keels off. Experience at sea demonstrated, as was to be expected, the desirability of these appliances. They have already been fitted on the Massachusetts, and will be fitted on the other vessels of the class at the earliest opportunity. The Indiana would have had them before this date but for the unfortunate breaking down of dry dock No. 3 at New York. As illustrating the behavior of the Massachusetts at sea, I may quote from the report of her commanding officer, on a trip from Boston to St. Johns. During this trip the Massachusetts passed within 250 miles of the center of a cyclone, encountering a wind which reached the force of ten on the Beaufort scale, and was accompanied by a very heavy sea. The vessel slowed down during the height of the storm, and her commanding officer reports as follows: 'During this time the ship behaved beautifully, never making less than six knots per hour, nearly on her course, and never rolling over five degrees. Her steadiness was so remarkable during the whole passage that it must be, in a great measure, attributed to the bilge keels.' One feature of the Indiana class, as regards which they have been markedly successful, is their steering. Turning trials of the Indiana, made Feb. 24, 1896, showed a tactical diameter of but three times the length of the ship, an exceptionally small value. Her manœuvering qualities and steadiness on a course are all that could be expected from a short, broad, comparatively shallow vessel."

ASSISTANT SECRETARY ROOSEVELT'S ADDRESS.

About 100 members and guests wer present at the annual dinner at Delmonico's. Col. E. A. Stevens was the toast-master and at the guests table were Assistant Secretary of the Navy Theodore Roosevelt, A. F. Yarrow, Capt. J. W. Muller of the naval reserves, Louis Nixon, V. N. Haywood, Prof. W. F. Durand, W. H. Webb, Capt. Mertage, Russian naval attache, Congressman Belford, Harrington Peckham and E. Platt Stratton. The dinner was served in the main dining room which was lavishly decorated with American flags. Assistant Secretary Roosevelt indicated at the beginning of his address that, although the present heads of the navy department will do all in their power to secure appropriations from the present congress for more ships, their first thought will be of dry docks. "We are confronted at present," Mr. Roosevelt said, "with the fact that the development so far has not been entirely symmetrical. The building of our warships has outstripped not only the building of dry docks, but even the gathering of a suitable quantity of projectiles, and especially of powder. Secretary Long has from the beginning shaped the policy of the department with a view to remedying these needs, so that, while the addition of new ships to the navy is not discontinued, yet existing deficiencies may be made good, as otherwise the ships will be useless. We need a large increase in the force both of officers and of enlisted men; but the most crying need of the navy at the moment is the need of first-class dry docks. Next comes the need for an ample quantity of smokeless powder and projectiles. We cannot get the best results with our excellent guns if we do not have the proper ammunition to put in them, and at present the supply of smokeless powder is insignificant."

Referring to the memorial of the New York chamber of commerce asking congress and the president for more batteries for the protection

of New York harbor, Mr. Roosevelt said that a system of coast defense must necessarily include ample fortifications; yet these fortifications by themselves will be of comparatively little avail, for the existence of a powerful fighting navy, capable of taking the offensive, is an indispensable feature in any proper scheme of national protection. This country cannot take its proper place among the nations of the earth and yet evade the responsibilities implied in taking that place. "We must dare to be great," Mr. Roosevelt said, "and yet all men who have studied our people know that it is not the men who desire to build up the navy who talk irresponsibly about warfare. Whether our navy was weak or strong would not, I firmly believe, influence the nation one particle about entering into or refraining from war; but it would make a very great difference in the attitude of a hostile power. The possession of a navy would be a preventive of, not an incitement to warfare; and if war should come it would insure our coming out of it with unchecked prosperity and indimmed renown. We have announced again and again our adherence to the Monroe doctrine. Unless we are willing to be put in the contemptible attitude of those who bluster without being able to back up their words by deeds, we must prove that our attitude about the Monroe doctrine is not a sham. To prove this means that we must have a powerful navy, for it is on the sea that we would have to meet every possible foreign foe. If we annex Hawaii, as every consideration of interest and honor bids, we shall need an adequate navy to enforce our position on the Pacific. If we do not annex Hawaii we shall need a much larger navy because we cannot play the part of "dog in the manger," and as Hawaii cannot stand alone some other power must necessarily take it, and from that moment menace our whole Pacific coast."

MEN WHO BUILT THE NEW NAVY.

Mr. Roosevelt's concluding remarks were highly complimentary to the members of the society. "During the last fifteen years" he said, "we have built the new navy, and, whereas, fifteen years ago we were contemptible among naval powers, our flag has now begun to take the place it should upon the high seas. In looking at this progress I scarcely know whether to admire most the men who handle these ships or the men who build them. One class is as indispensable as the other. No matter how perfect a ship might be, nor how formidable as an engine of destruction, she would be useless if she were not handled with consummate skill and courage in the supreme hour of her life; the hour for which all else is but preparation. And so on the other hand, no matter how great that skill and courage, they could not avail unless they worked with the best implements and the best weapons. Our naval architects, our marine engineers, began fifteen years ago as untried men in an unknown field. They have now proved their right to stand as the full equals of any in the world. With equal daring and energy, with bold initiative and inexhaustible fertility of resource, with fearlessness of responsibility, and readiness both to apply new methods when necessary and to adopt from any source old methods which have already been tried and found to be successful, they have bent all their powers of mind and body to the task before them; and they have been rewarded by the most striking triumphs. They have trained, not only themselves, but all the men under them, from the constructors to the riveters and carpenters. They have gathered together great plants and assembled the men who knew how to make use of them. Instead of being daunted by any failure they have made each error a stepping-stone to future triumph. They have built us a navy which, ship for ship, need not fear comparison with any navy in the world. It would be a cruel disaster if the nation should lack the wisdom to continue to profit by the experience these men have gained, and should permit the plants they have built up and the experts they have trained to be scattered. We should continue at all hazards the wise policy of building up the navy which is at this time our greatest national need."

Short speeches were made by Mr. Yarrow, Mr. Nixon, Congressman Balford and several members of the society. Mr. Yarrow said he should return to England with the fondest regards for the American people who had so royally entertained him during his stay in this country. "You have reason," he said, "to be proud that the steamship St. Paul was built on your shores. I am thoroughly convinced that with our present knowledge, the vessel could not be improved on. It is an honor to you that the boat was built here."

For about twenty-five years the Crosby Steam Gage & Valve Co., with headquarters in Boston and offices also in New York, Chicago and London, has been actively engaged in the production of instruments for use on steam boilers and steam engines and its sales have extended into nearly every country of the world. A complete catalogue, just issued by this firm, is certainly an interesting book. The clearness of all of the illustrations, covering innumerable specialties designed for steam users, is remarkable. Special features of the catalogue are the Crosby company's indicator, spring seat valve, blow off valve, and also their recorders, especially the mine and draft recorder. Six pages are devoted to artistic illustrations of gage boards, which are a new feature in the trade and are made in black, Knoxville and white marble. These designs are made to special order. Other instruments clearly illustrated and described are the Crosby revolution counter and the Crosby illuminated pressure gage. This latter gage is a very novel arrangement and is worthy of the attention of anyone who is required to work nights in the engine room. The revolution counter, unlike most instruments of its kind, is durable and suited to a steam engine, as it employs the crank principle and will not fail to register, or get out of order.

In the Journal of the American Society of Naval Engineers for November, First Assistant Engineer C. A. McAllister of the revenue cutter service gives an account of the contract trials of the cutters Manning and McCulloch. These are single-screw, composite vessels. The Manning was built by the Atlantic Works of East Boston, Mass., at a contract price of $159,951 and the McCulloch by the Cramps at a price of $196,750.

An up-to-date lithograph map of the Alaskan gold fields, printed in six colors, complete and accurate. If interested, send five 2-cent stamps to advertising department, Nickel Plate Co., Cleveland. Dec. 31, 393.

Contracts for New Ships.

New York, Nov. 17.—The most important announcement in Atlantic coast ship building circles this week comes from Bath, Me., where the Bath Iron Works has just secured a contract for a steel cargo steamer, to cost about $175,000, from Miller, Bull & Knowlton of New York city. Dimensions and other particulars of the new vessel are: Length over all, 303 feet; water line, 290 feet; breadth, moulded, 42 feet; depth, moulded, center, 25 feet 8 inches; depth of hold, 23 feet 8 inches; displacement, loaded, 5,125 tons; dead weight capacity, 3,818 tons; grain space, 177,000 cubic feet; coal bunker capacity, 460 tons. Triple expansion engines, supplied with steam from two Scotch boilers, will develop about 1,300 horse power and the speed of the vessel will be about 10 knots. The steamer will have a double bottom for water ballast and her scantlings will be made especially strong. Four cargo hatches, two spars carrying small sails, stockless anchors, steam windlass and steam steering gear, as well as four steam winches, are other features of the vessel. Officers' quarters, galley and dining room will be amidships, and in the after part of the vessel on the poop deck a few staterooms will be arranged for passengers. The crew will be quartered in a forecastle. This steamer, built for general freight trade, will be superior in many respects to vessels of the tramp type, but it is expected that with economical management she can compete with that class of freight carrier. Miller, Bull & Knowlton are proprietors of the New York & Porto Rico Steamship Line.

The management of the Roach ship yard at Chester, Pa., is expecting from the Yukon Co. of Seattle, Wash., a contract for two steel passenger and freight steamers for the Alaskan trade that will be of 5,000-ton type, costing more than any ships as yet built in this country, excepting the St. Louis and St. Paul, but as yet the order is not signed, notwithstanding dispatches to the contrary sent out from Philadelphia. Andrew F. Burleigh, late receiver of the Northern Pacific Railroad, is president of the company that proposes to build these steamers, and it is said that he has let a contract to Moran Bros. of Seattle for the construction of twelve modern river steamboats, twenty-four barges and two towboats, to cost altogether nearly $1,000,000, and to be used in the Yukon country. The plans on which the Roach yard is figuring provide for steamships about 415 feet in length, 48 feet beam and 27 feet depth of hold, with a freight carrying capacity of 2,800 tons, in addition to coal bunkers capable of carrying 1,500 tons. Accommodations are to be provided for one thousand passengers, 100 of whom are to have first-class, 300 second-class and 600 third-class accommodations. The ships are to maintain a speed of fifteen knots. The company has leased ships to begin the season with next spring, and it is expected that the new ships will be ready for service late in the summer.

Ship yards in and around Baltimore are busier than usual. At the plant of the Columbian Iron Works & Dry Dock Co. there are nine contracts on hand. These include the Holland submarine torpedo boat Plunger and the submarine wrecking vessel Argonaut, both of which are nearing completion. One of the light-house steamers, the Hally, is being lengthened 20 feet and is getting new boilers and a general overhauling. Then there is the torpedo boat McKee and the new revenue cutter for New York, as well as the torpedo boats Rodgers and Winslow, the latter of which has been reported to the navy department as ready for trial. The new excursion steamer, which Chas. Reeder & Sons, also of Baltimore, will build for the Baltimore & Port Deposit Steamship Co., will be 160 feet in length, 30 feet beam, with a 4-foot guard rail, and 10½ feet deep. Engines will be compound, with cylinders of 20 and 38 inches diameter and 28 inches stroke. Thomas McCosker & Co. are building a tug for P. Dougherty & Co. Both of these are Baltimore firms. Philip Weaver & Son, also tug owners of Baltimore, are to have a tug of 100 feet length built at Madison, Md., by B. J. Brooks. Engines and boiler for this vessel will be built by the E. J. Codd Co. of Baltimore.

The Harlan & Hollingsworth Co. of Wilmington, Del., has just turned over to the Merchants' & Miners' Transportation Co. of Baltimore the new four-deck passenger steamer Juniata. This steamer is 270 feet on the water line, 42 feet moulded beam, and 34 feet depth of hold, and is the fourth ship of her kind built by the Harlan & Hollingsworth Co. for the same firm.

A dispatch from Philadelphia says that John Dougherty, at the head of a syndicate of bankers, has contracted with the Cramps to construct four new steel 15-knot single-screw steamers for the foreign fruit trade, but there is no verification of this report from the builders.

Ships for the Alaskan Trade.

Charles H. Cramp of the Philadelphia ship building firm is at the head of a big project for furnishing transportation to the Alaskan gold fields. The States Steamship Co. has been organized under the laws of New Jersey with a capital of $7,000,000 and with Mr. Cramp as its president. The new company has completed arrangements by which it acquires from the International Navigation Co. the five steamers, Ohio, Pennsylvania, Indiana, Illinois and Conemaugh. A New York dispatch quotes Mr. Cramp as saying that as soon as these steamers can be fitted at Philadelphia for the Pacific service, they will be sent around to the west coast and will ply regularly from San Francisco or Seattle to St. Michael's. The Ohio will be the first steamer to sail and will leave early in December, to be followed by the four others, all leaving by March 1. To act in conjunction with these steamers a fleet of light draught vessels are being built as rapidly as possible to make the service up the Yukon river. The Ohio will reach Seattle about the first of February.

S. S. Jordan, formerly with the Chicago Ship Building Co. and the Newport News Ship Building & Dry Dock Co., has opened an office in the Bowling Green building, New York city, and will act as a consulting engineer in naval architecture and marine engineering.

The Bethlehem Iron Co., South Bethlehem, Pa., shipped to Newport News, Va., recently, ten side armor plates, weighing 276 tons, for use on the new battleship Kentucky.

All charts sold by the Marine Review are corrected to date of sale.

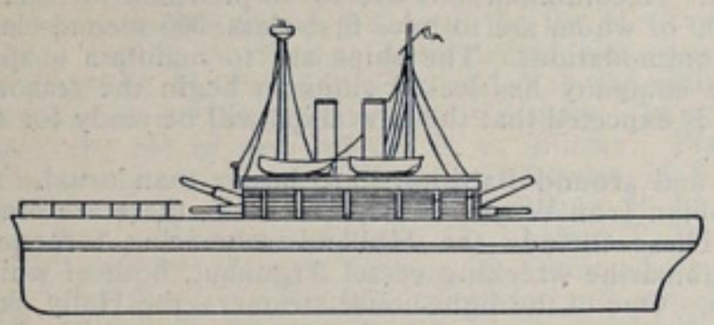
SHIPS OF THE LEADING NAVAL POWERS.

In the following comparison of battleships, cruisers, coast defense ships, look-out ships and torpedo gunboats, the classification and the figures in Brassey's Naval Annual are followed, and only those ships are included which were launched when the 1897 edition of the annual was published in May last. The new battleships of the United States navy and the several torpedo boats now building are therefore not in the list. The navy of the United States will make a better showing when the 1898 issue of this work is published:

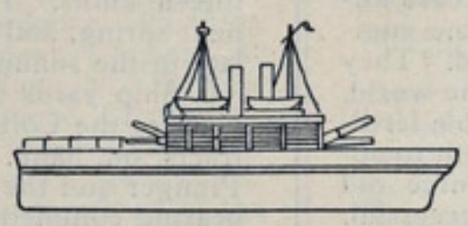
	UNITED KINGDOM.		FRANCE.		RUSSIA.		GERMANY.		ITALY.		UNITED STATES.	
	No.	Tons.	No.	Tons.	No.	Tons.	No.	Tons.	No.	Tons.	No.	Tons.
First-class battleships, A division	20	273,530	9	104,881	4	45,360	4	9,874	3	39,814	3	31,876
" " B division	9	93,370	9	98,890	5	50,296	....	.....	5	60,811	1	10,288
Second-class battleships	7	69,690	8	61,355	6	49,308	4	29,132	2	21,987	...	.....
Third-class battleships, A division	8	65,710	3	26,484	1	8,750	3	20,228	...	.....	...	.....
" " B division	13	70,760	6	36,870	4	19,955	3	22,929	3	12,399	...	.....
Total battleships	57	573,060	35	328,480	20	173,669	14	82,163	13	135,011	4	42,164
First-class cruisers	22	149,950	8	43,819	5	36,394	1	6,956	1	4,527	6	....
Second and third-class cruisers	59	219,005	11	40,877	3	11,000	3	12,704	13	34,348	13	.....
Coast defence ships	14	65,400	15	56,298	12	35,226	18	36,144	...	.....	19	.....
Look-out ships	19	36,240	12	19,005	...	.....	11	16,837	...	.....	...	.....
Torpedo gunboats	34	28,579	13	7,146	8	3,911	10	3,212	15	11,516	...	.....
Destroyers	92		14		15		6		16		9	.....
Torpedo Boats—												
Seagoing, 126 feet to 150 feet	43		36		73		95		96		13	
First-class, 115 feet to 125 feet	26		69		6		4		...		...	
Second-class, 101 feet to 114 feet	4		78		1		9		4		5	
Third-class, 86 feet to 100 feet	20		36		...		....		36		1	
Vedettes, 85 feet and under	73		9		109		16		32		4	

The following diagrams show pictorially the same set facts that are given statistically above. Thus, in the first line, if the size of the first battleship be taken to represent the numerical strength of the British fleet in that arm, then the French vessel shows the strength of the French fleet, and so on.

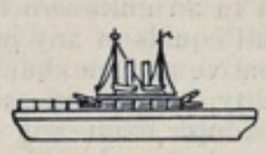
BATTLE SHIPS.



GREAT BRITAIN

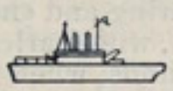


FRANCE



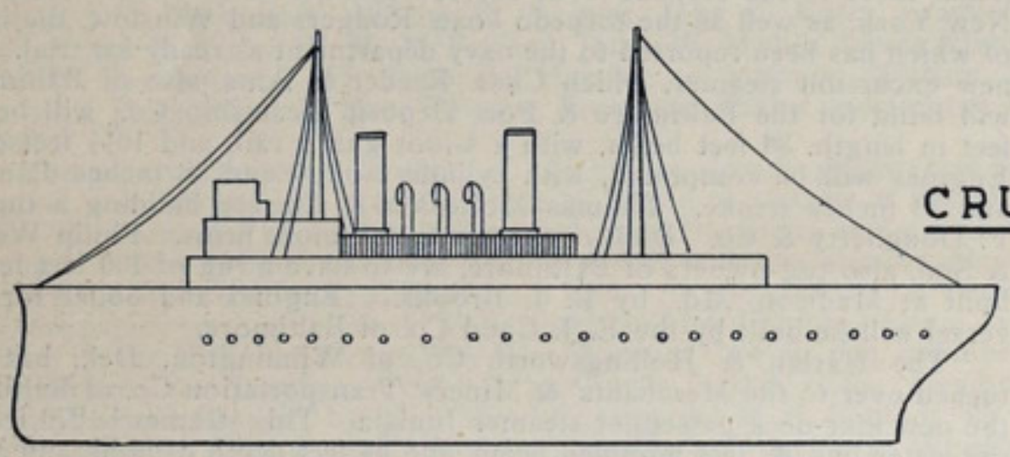
RUSSIA

GERMANY



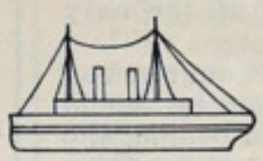
ITALY

U.S



GREAT BRITAIN

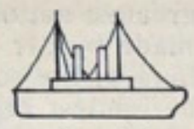
CRUISERS.



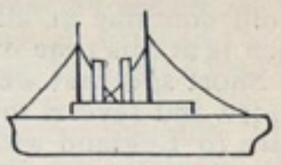
FRANCE

RUSSIA

GERMANY

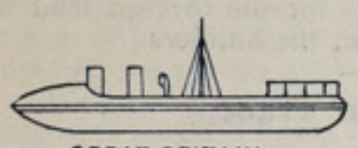


ITALY.

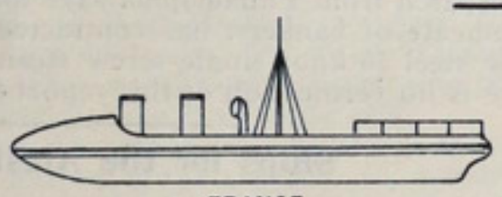


UNITED STATES

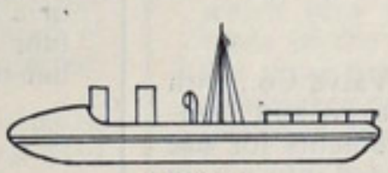
TORPEDO BOATS.



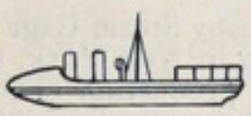
GREAT BRITAIN



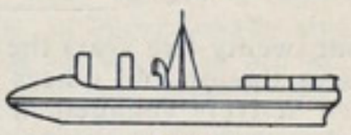
FRANCE



RUSSIA



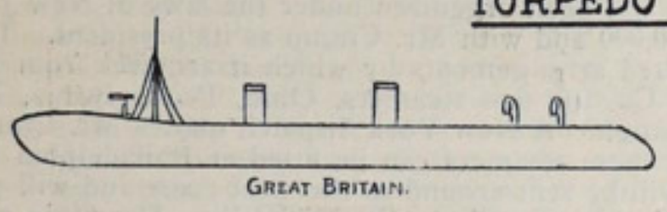
GERMANY



ITALY

U.S.

TORPEDO DESTROYERS.



GREAT BRITAIN.

FRANCE

RUSSIA

GERMANY

ITALY

U.S.

TORPEDO GUNBOATS.

GREAT BRITAIN.

FRANCE

RUSSIA

GERMANY

ITALY.

Around the Lakes.

The small ore dock of the Chicago & Northwestern company at Ashland will be rebuilt during the winter at a cost of about $145,000.

It is understood that the treasury department will sell the old revenue cutter Fessenden upon completion of the two cutters for the lakes now building at the works of the Globe company, Cleveland.

Capt. Ben. Trip, who has been piloting in Georgian bay, says there is plenty of water there for any vessel navigating our present lake channels. He took the steamer R. E. Schuck into Midland, drawing 16 feet 8 inches.

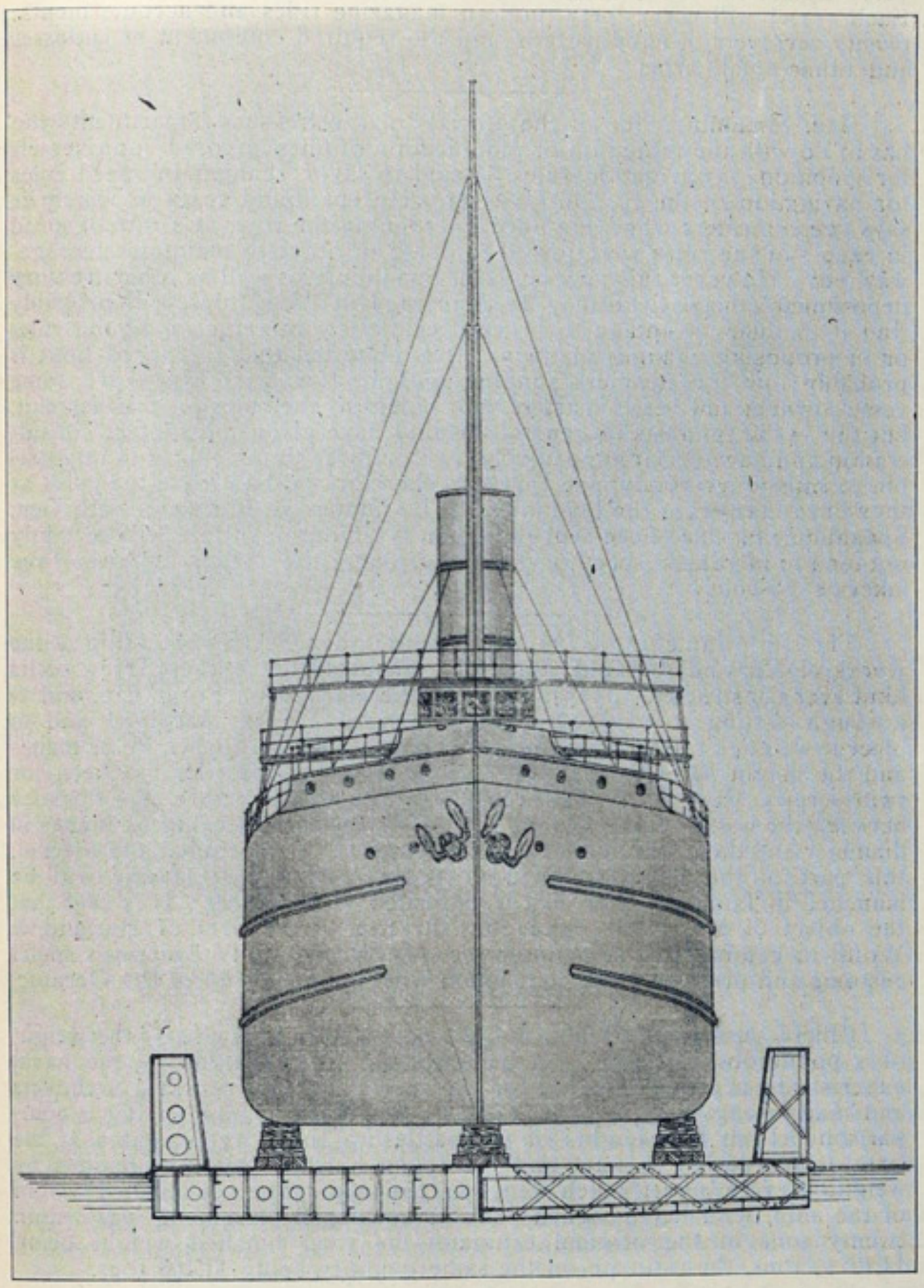
Just twenty-two and one-half hours after the Lehigh Valley liner Saranac had arrived in Chicago with 880 tons of general merchandise on Thursday last, she left with 2,400 tons of east-bound package freight. In that time the steamer had gone to five docks, and 3,200 tons of general freight had been handled.

Capt. John F. Parke of the steamer A. D. Thomson informs Geo. L. McCurdy of Chicago that on the 10th inst., when twelve miles north of Big Sable, Lake Michigan, and on the course from Milwaukee to the Manitou, he passed through considerable wreckage, including bulwarks painted white inside, a cabin bulkhead with door attached, which was painted yellow or grained, and a large piece of deck, about 25 by 40 feet in dimensions, floating beams up with pawl post attached, the latter painted white. It is quite probable that this wreckage was from the lost schooner F. W. Gifford.

"It would seem to me," said a captain who returned from the head of the lakes the other day, "that the American Steel Barge Co. is losing money in not going ahead with the construction of the second dock which they propose to build. While I was there the Wallula was in the dock and the Samuel Mather was undergoing some repairs at Duluth, and from what I could learn they have had numerous cases of late of vessels applying for the dock, but when it was found that they could not be accommodated immediately they were ordered to proceed down the lakes as best they could and have repairs made below."

Floating Dry Dock for Cleveland.

Officials of the Globe Iron Works Co., Cleveland, have for some time past been considering the advisability of constructing a floating or pontoon dry dock, to be operated in connection with their ship yard in the old river bed. The plans, which are partly shown by the accompanying engravings, have been quite thoroughly discussed, and it is now announced that prep-



SECTIONAL PLAN OF PONTOON DRY DOCK.

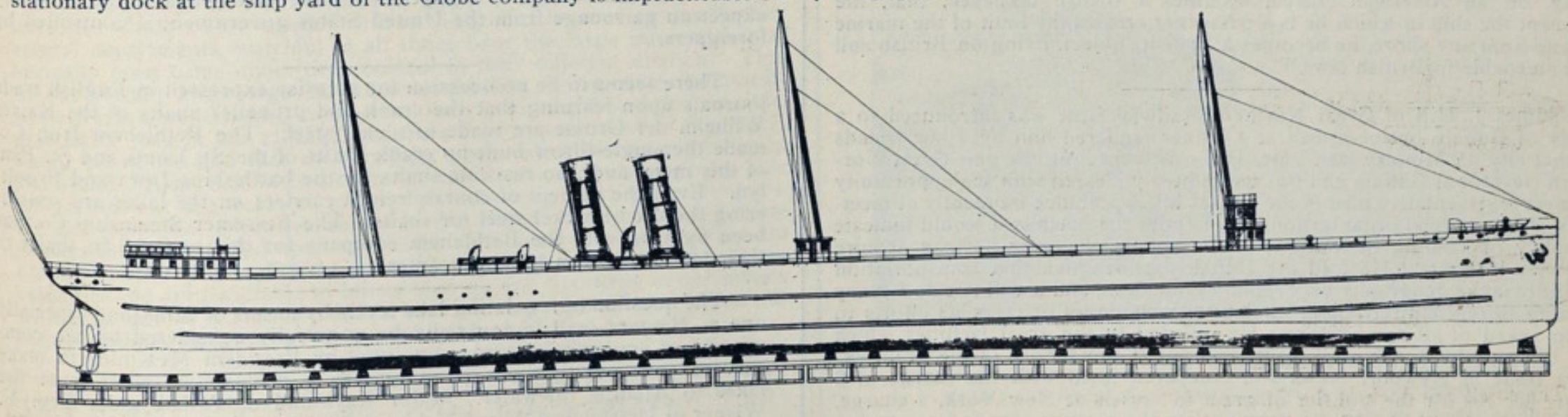
arations for the purchase of material are being made and that the structure will be built as rapidly as possible. The building of this dock by the Globe company is undoubtedly prompted by the action of the Ship Owners' Dry Dock Co. in putting in a plant for the repair of steel vessels, and thus preventing ship builders from engaging in repair work at their docks. As a stationary dock at the ship yard of the Globe company is impracticable on account of the river frontage required for the building of new vessels, it is proposed to dredge a slip about 500 feet long and 75 feet wide at the upper end of the yard, parallel to the river, in which to station the pontoon dock. This would still permit of three building berths being maintained, as the third one would have frontage on the slip provided for the floating dock, and the latter could be worked in and out of the river as desired. It is estimated that a floating dock of the kind proposed can be built for about $100,000, and that the cost of the slip, dock and all other appliances complete will not exceed $150,000.

The lower portion of the dock will consist of sixteen independent pontoons, which can each be separated from the rest of the structure and repaired or painted, one by one, entirely independent of each other. At the ends arrangements are made by which, if necessary at some future date, the dock can be lengthened by adding additional pontoons and the lifting power correspondingly increased. Principal dimensions of the structure are as follows: Length over all, 496 feet; extreme breadth, 71 feet; thickness of side caisson at top, 5 feet; thickness of side caisson at bottom, 6 feet; space between caissons at bottom, 58 feet; space between caissons at top, 60 feet; length of each pontoon, 30 feet; space between pontoons, 1 foot; height of pontoons at center, 6 feet; distance from top of pontoons to top of side walls, 16 feet; lifting capacity of each pontoon, 200 net tons; lifting capacity of all sixteen pontoons, 3,200 net tons.

The draft required for docking a vessel will be about 18 feet, provided the draft of vessel aft does not exceed 8 feet. Such a draft can readily be secured in modern lake vessels by trimming them by the head, thus bringing them more on an even keel. This can be easily done by filling the forward compartment or forward trimming tank. If a draft of more than 18 feet is required for the dock, it can be secured, of course, by dredging the channel or slip in which it is stationed. The sixteen pontoons forming the floor of the dock are to be alike in construction. They will be built up of twenty and fifteen-pound plates, connected together with angles and stiffened in the middle by diaphragm of twenty pounds per square foot, which will divide each pontoon into two water-tight compartments. Additional stiffeners in the way of channel cross beams will be applied to both top and bottom of each pontoon at distances of 3 feet. Screw couplings will be used to connect the side walls with the pontoons. Piping for each pontoon will be made in duplicate, the various regulating valves being grouped together on one pontoon and operated by compressed air. Provision will be made in the piping and valves, so that the dock may be extended if required. Arrangements will also be made for indicating the list of the dock in any direction. Archways or doors will be cut in the caissons, so as to facilitate the transfer of material to and from dock, and a portable foot bridge will also be provided to permit of passage from one pontoon to another when the dock is submerged. Pumps will be so arranged that they may be operated either from the dock or ashore. Two admission pipes about 9 inches in diameter will be fitted for filling each pontoon, and fitted with double valves, so that in case of one being displaced the other can always be used for closing the filling pipe. The principal suction pipe for each pontoon will be about 14 inches in diameter, to which on one side will be connected two pump suctions and on the other the various subsidiary suction pipes belonging to each pontoon, valves being placed at the junction of these latter, so that when desired the water can be emptied from either one of the two compartments of each pontoon without affecting the other. In case it is found necessary, suction and filling pipes can be fitted to caissons. Blocks or cradles will be fitted about 6 feet apart, both forward and aft, and they will be so arranged that they can readily be adjusted to the form or shape of the vessel's hull. About three winches or capstans and other necessary bitts, cleats, etc., will be fitted for docking purposes and for the handling of material. Adjustable shores will be provided and so arranged as to prevent any possibility of a vessel shifting its position on the blocks or cradles. Moulded dimensions of each pontoon will be 70 by 30 by 6 feet, and the weight of each will be 113 tons. The total weight of the dock with machinery, etc., will be 2,420 net tons, and its total displacement at 5 feet 5 inches draft will be 5,260 tons.

If by calculations involved in plans for this dock it has been found that 18 feet of water will be sufficient to dock boats that may be brought down by trimming to 8 feet draft, it would seem that the operation would be comparatively easy in 22 feet of water, the depth which it is proposed to secure for the dock by dredging.

As indicated by statements of Howden hot draft equipments, published elsewhere in this issue, the Dry Dock Engine Works of Detroit is meeting with wonderful success in the application of this specialty to lake vessels, new contracts being announced each week. The latest order is from the Bertram Engine Works of Toronto, that company having just secured a contract for a large steel passenger steamer for the Toronto-Charlotte route. Particulars of the vessel are not as yet at hand, but she will undoubtedly be modern in every way and high-powered, as the hot draft equipment is to be suited to about 2,500 horse power. In his annual report, the engineer-in-chief of the navy, Commodore Geo. W. Melville, refers to this draft on the fast torpedo boat Wheeling, particulars of the trials of which are published elsewhere in this issue. "The performance of the Wheeling," says Commodore Melville, "is remarkable, and it may be attributed in a great measure to the Howden system of hot draft, with its attendant economy in production of steam."



SIDE ELEVATION PLAN OF GLOBE COMPANY'S PROJECT FOR PONTOON DOCK.

The Review is indebted to A. J. Maclean, professor of naval architecture at Webb's Academy, for a copy of a neat pamphlet descriptive of the academy at Fordham Heights, New York city, and containing also requirements for admission, courses of instruction, etc. Several half-tone engravings illustrating the academy and surrounding grounds, as well as drawing room, mould loft, lecture room, students' quarters, etc., are especially interesting.

MARINE REVIEW

DEVOTED TO LAKE MARINE AND KINDRED INTERESTS.

Published every Thursday at No. 409 Perry-Payne building, Cleveland, Ohio, by John M. Mulrooney and F. M. Barton.

SUBSCRIPTION—$2.00 per year in advance. Single copies 10 cents each. Convenient binders sent, post paid, $1.00. Advertising rates on application.

Entered at Cleveland Post Office as Second class Mail Matter.

The books of the United States treasury department on June 30, 1896, contained the names of 3,333 vessels, of 1,324,067.58 gross tons register in the lake trade. The number of steam vessels of 1,000 gross tons, and over that amount, on the lakes on June 30, 1896, was 383 and their aggregate gross tonnage 711,034.28; the number of vessels of this class owned in all other parts of the country on the same date was 315 and their tonnage 685,204.55, so that more than half of the best steamships in all the United States are owned on the lakes. The classification of the entire lake fleet on June 30, 1896, was as follows:

	Number.	Gross Tonnage.
Steam vessels	1,792	924,630.51
Sailing vessels and barges	1,125	354,327.60
Canal boats	416	45,109.47
Total	3,333	1,324,067.58

The gross registered tonnage of the vessels built on the lakes during the past six years, according to the reports of the United States commissioner of navigation, is as follows:

Year ending June 30.	1891	204	111,856 45
" " "	1892	169	45,968.98
" " "	1893	175	99,271.24
" " "	1894	106	41,984.61
" " "	1895	93	36,352.70
" " "	1896	117	108,782.38
Total		864	444,216.36

ST. MARY'S FALLS AND SUEZ CANAL TRAFFIC. (*From Official Reports of Canal Officers.*)

	St. Mary's Falls Canals.			Suez Canal.		
	1896*	1895*	1894	1896	1895	1894
Number of vessel passages	18,615	17,956	14,491	3,409	3,434	3,352
Tonnage, net registered	17,249,418	16,806,781	13,110,366	8,560,284	8,448,383	8,039,175
Days of navigation	232	231	234	365	365	365

*1895 and 1896 figures include traffic of Canadian canal at Sault Ste. Marie.

"As the foundation of the colossal structure of England's ocean commerce is the English ship yard," says Louis Nixon in the North American Review, "so also upon the foundation of the American ship yard will rise a powerful American merchant marine. At best, our attitude towards sea power, both naval and commercial, is that of aspiration. England's attitude is that of possession. It must be admitted, however, that even this aspiration, up to date, is sentimental rather than practical, so far as the general American public is concerned. Almost every American who travels abroad regrets, or is ashamed of, the absence of our flag from the commercial ports he visits. But he only misses the flag, which his instinct of patriotism impels him to wish he could see. He does not, as a rule, reflect that the absence of that flag means in money a yearly tribute of $300,000,000 to England! It does not occur to him that if he could see that flag everywhere he goes, it would mean that $300,000,000 every year is staying in American pockets instead of being, as it is, drained every year from ours into English pockets. He does not even realize that his own travel involves the transfer of American money to English pockets. He has not studied the economics of the matter enough to realize that the most portentious fact of our time is that the moment the gang-plank is cleared away, he, an American citizen, becomes a British taxpayer; that, the moment the ship in which he is a passenger crosses the limit of the marine league from any shore, he becomes a British subject, living on British soil and amenable to British laws."

James J. Hill of Great Northern Railway fame was introduced to a party of Buffalo business men at a dinner tendered him by a few friends in that city on Monday last. Mr. Hill was inspecting the new Great Northern elevator at Buffalo and was undoubtedly pleased with the opportunity to meet representative men of the city, as his appearance frequently at meetings of commercial organizations throughout the northwest would indicate a policy of keeping in touch with the people wherever he may acquire business interests. He told the Buffalo businessmen that transportation facilities make geography very rapidly these days, and it will not do for any locality to rely entirely upon its natural advantages or relax its efforts to keep ahead of all competitors. He referred to the great facilities which the Chesapeake & Ohio rail route had put at the service of the grain export trade at Newport News and compared them with the charge of 3 cents per 100 for the transfer of grain to vessels at New York, a charge, as he pointed out, 50 per cent. greater than the average charge for carrying the grain from Duluth to Buffalo. "The business of transportation in these times," said Mr. Hill, "must be done in a most economical and efficacious manner. The times will not admit of the carrying of any dead wood. It is for the interest of all citizens of Buffalo that the current of commerce setting in this direction should not in any way be impeded."

It would seem strange that any objection should be made in Canada to bringing an old vessel like the Yantic to the lakes when modern ships like the two new revenue cutters, to be launched shortly at the Globe Works, Cleveland, are being built by both countries. These vessels are much the same as the Gresham, already built, and when they are in commission the United States government will have on the lakes, whatever may be said to the contrary, three ships that could be readily fitted up for effective service in case of trouble. These cutters are fitted with ram bows, which make them far more formidable than was any one of the fleet of the immortal Perry on the lakes in that interesting brush with Great Britain, about 100 years ago. In addition to ramming bows the new vessels will be equipped in time of danger with torpedo tubes. At present, on account of the treaty in regard to arming on the lakes, the cutters will be equipped with only one rapid fire rifle gun, six-pounder, but in time of necessity they will be able to take on four more of such guns. These are breech-loading, cartridge-ejecting guns, and would be very destructive against ordinary shipping or against a land defense. Each vessel will carry forty modern magazine rifles and accouterments, twenty revolvers of navy pattern, and the required equipment of cutlasses and other small arms.

Gen. Spaulding, one of the officials of the treasury department who has to do with the remission or modification of fines imposed upon vessels for violation of navigation rules, is said to favor changes in speed rules for navigation of the St. Mary's river. He has found cases in which he says vessel masters who were fined for running the river at a rate of speed in excess of the rules were forced to do so in order to maintain steerageway, etc. However this may be, Gen. Spaulding, as well as other treasury department officials who may be concerned in these rules, will probably find it to their advantage to proceed cautiously in criticism of the rules or in proposing changes of them. It is admitted that the speed limit is probably low for steamers running without tows, and there are some vessel owners and vessel masters who object to the rules on this account, but the vessel interests in general meeting have given the subject consideration and have declared positively, two or three times, that it is impossible to satisfy everybody, and that it is therefore best to leave the rules as they have been from the beginning. The numerous interviews with Gen. Spaulding that have been sent out from Washington of late will certainly not tend to increase respect for these rules or for the navigation laws of the lakes as a whole.

The stern frame of the 700-foot Atlantic liner Oceanic, building at the works of Harland & Wolff, Belfast, is probably the biggest thing of its kind ever constructed. It was made by the Darlington Forge Co., and as a rough casting it weighed forty-three tons. When machined and in place it weighed thirty-eight tons, the section being 21 inches by 11 inches and the height 53 feet from the lower part. The propeller brackets, for twin screws, have been worked securely into the structure, the distance between the bosses being 23 feet, the bosses themselves being 51 inches in diameter and their fore and aft length 67 inches. As machined and erected, this part of the frame weighed thirty-six tons. The Oceanic will be launched in January. Her cost is estimated at $3,750,000. It is said that the object of Mr. Pirrie, managing director of the firm of Harland & Wolff, in coming to this country recently was to study American social customs and preferences in connection with the fitting up of the Oceanic.

Chief Constructor Hichborn of the navy shows how closely the weight of a ponderous battleship can be estimated from designs by the naval experts. In a paper prepared for the recent meeting of naval architects and marine engineers in New York he presented a table giving a comparison betwen the weights of the battleship Iowa, as estimated at the time of her design in 1892, and the actual finished weights obtained by weighing every object which went into the ship. The net finished weight of the ship, with her designed coal, at normal displacement, was within twenty tons of the original estimate—the total finished weight being 11,127½ tons, the estimate on the same quantity being 11,108 tons.

It is again reported that the ship building plant at Newport News, Va., is to be sold out to Lord Armstrong of Newcastle-on-Tyne. Some time ago, Sir Edward J. Reed, the London shipping expert, visited Newport News and subsequently arranged a meeting between Lord Armstrong and Mr. C. P. Huntington. Rumors of a sale of the ship yard to Englishmen have been heard off and on since that time. It would seem strange, however, that such a sale should be even thought of, as the Newport News concern, now engaged on three battleships, could certainly expect no patronage from the United States government if controlled by foreigners.

There seems to be no occasion for surprise expressed in English trade journals upon learning that the crank and propeller shafts of the Kaiser Wilhelm der Grosse are made of nickel steel. The Bethlehem Iron Co. made the single-throw built-up crank shafts of the St. Louis and St. Paul of this metal and also two line shafts for the battleships Iowa and Brooklyn. Even the owners of course freight carriers on the lakes are considering the use of nickel steel for shafts. The Bessemer Steamship Co. has been figuring with the Bethlehem company for this material in shafts of their latest 6,000-ton freight steamers.

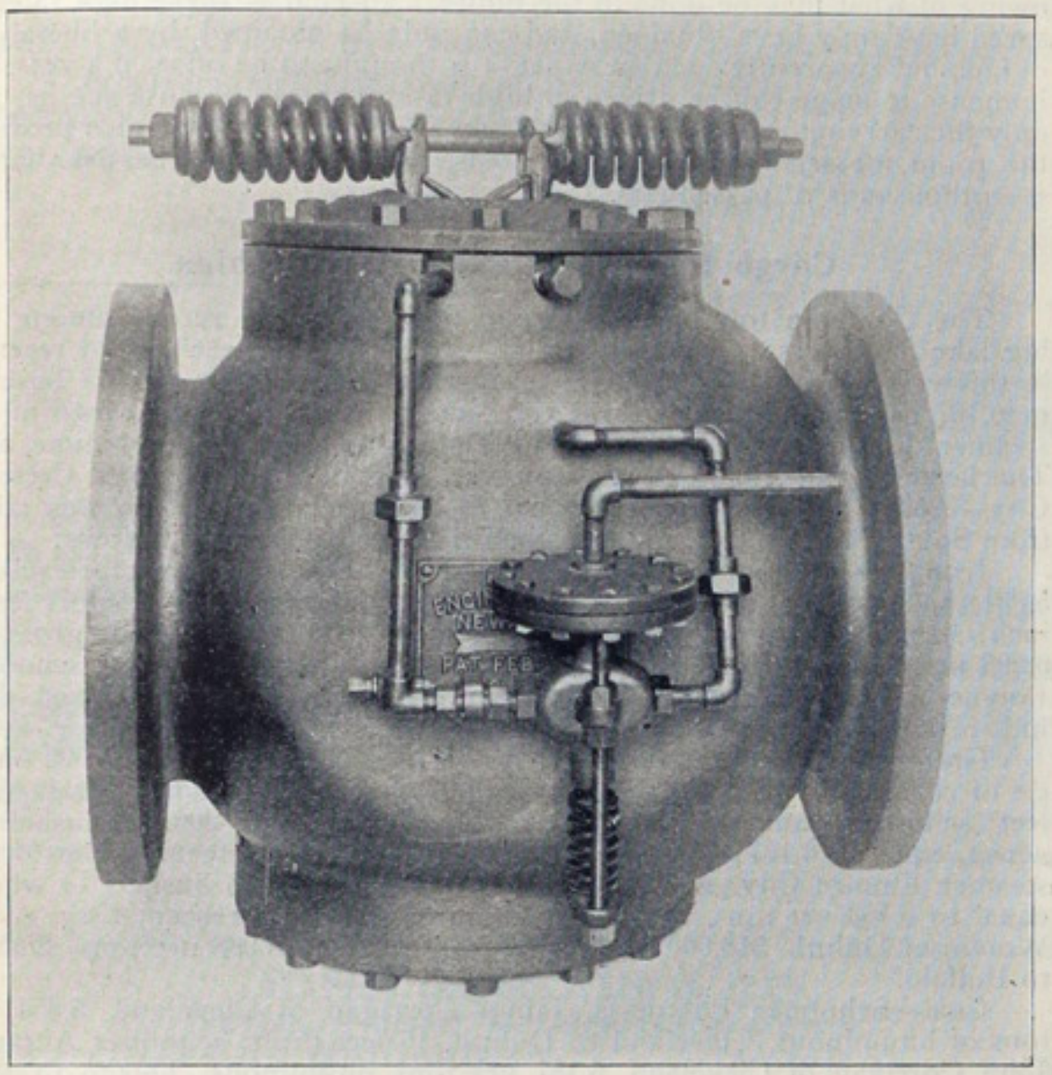
The question of regulating lake levels by means of dams, and especially one at Niagara, will undoubtedly be quite fully considered by the commission of engineers recently appointed by President McKinley to make surveys and investigations pertaining to a deep-water outlet from the lakes to Atlantic tidewater. Major Raymond of Philadelphia, Geo. Y. Wisner of Detroit and Alfred Noble of Chicago, constituting this commission, spent a couple of days last week inspecting parts of the Detroit and St. Clair rivers that are involved in the problems which they have in hand.

Pig iron production throughout the country is now close to the maximum record of 1895. On Nov. 1 the production in 183 furnaces was at the rate of 213,159 tons weekly. The decline in stocks, however, is such as to indicate that even this heavy production is not in excess of the consumption. Just now the market is a little easier than it has been for two or three months past, but there is little, if any, reserve capacity left in the furnace line.

German steel castings of the largest and most difficult type have lately been produced in a manner and at a price which British manufacturers have been unable to touch, and it is now no secret that British builders have, much against their will, been compelled to go to Germany for such material.—Nautical Magazine (English).

Gen. Dumont Quotes the Ship Masters.

Editor Marine Review:—As you have so kindly admitted to your columns recently several communications abusive of the steamboat inspection service and its officers, from persons evidently of the class described on page 11 of your last issue in an article headed "That Double-Track Idea," as "land navigators * * * trying to reform a business of which they have proven themselves quite ignorant."—I refer particularly



TEN-INCH, CLASS W, FOSTER PRESSURE REGULATOR, SPECIALLY CONSTRUCTED FOR THE PENN'A RAILROAD FERRY-BOAT NEW RRUNSWICK.

to your correspondent "Veritas" ???, Oct. 7; "Observer," Oct. 21; and H. S. Spencer, Nov. 11—it has occurred to me that it would be but a matter of justice for you to publish the opinions of the representative men, the *real* navigators of the great northwestern lakes, as expressed in the Grand Lodge of Lake Ship Masters at their session in this city in January, 1896.

The resolution referred to was presented to the board in person, Jan. 27, 1896, by the representative gentlemen whose names are attached thereto, names that I am sure will be recognized the whole length of the lakes as those of gentlemen better qualified to speak on the subject-matter of their resolution than are the "land navigators" referred to in the first paragraph of this communication. Following is the verbatim text of the resolution:

"Grand Lodge, Ship Masters Association:

"Your committee on resolutions beg leave to submit the following report:

"RESOLVED, That it is the sense of the Ship Masters Association, comprising all masters on steamers on our great north-western lakes, first, that we appreciate that in our present board of supervising inspectors we have men whom we are satisfied with as being efficient in every way in their several departments, watchful at all times over the large interest that of necessity must come under their control in their different districts. That to our certain knowledge in our own districts, comprising the north-western lakes, we have two members of the supervising board that are able, practicable men in our calling; that since their appointment to the supervising board we find that their rulings when called for were intelligent and broad. Also, that in Inspector-General Dumont we have a very able officer, efficient and watchful, always, over the large territory he controls. He has wonderful executive ability in the administration of the delicate matters that he is called upon to decide. The number of people that are carried in craft that is directly under his eye have fewer accidents, fewer casualties and are less liable to injury than on any waterway in our known world, all due in a measure to his untiring zeal in the cause of careful inspection looking towards the cause of safety to life and property.

Very respectfully,

WM. S. MACK,
J. A. HOLMES,
B. YOUNG,
Committee."

{ Seal of Grand Lodge of Ship Masters Association. }

Attested: { W. A. COLLIER, Grand Fin. Sec. / GEO. MCCULLAGH, Grand Pres. }

Washington, D. C., Nov. 15, 1897.

JAMES A. DUMONT.

The steambarge Myrtie M. Ross has jus. been rebuilt at the Manistee Ship Yard, Manistee, Mich., receiving 4-inch ceiling and new deck. She was also recaulked, making her practically stronger than when new. Her machinery is in good order, and her owner, J. F. Smith of South Haven, expects to run her for still another month this fall.

Barographs, or self-registering barometers, as they are commonly called, are being placed aboard lake vessels by officials of the weather bureau. As yet the number available is not large but it is expected that a liberal supply will be furnished to the lakes from headquarters next spring.

Trials of Two United States Torpedo Boats.

The following report of trials of two of the new torpedo boats was recently received from the bureau of steam engineering, navy department:

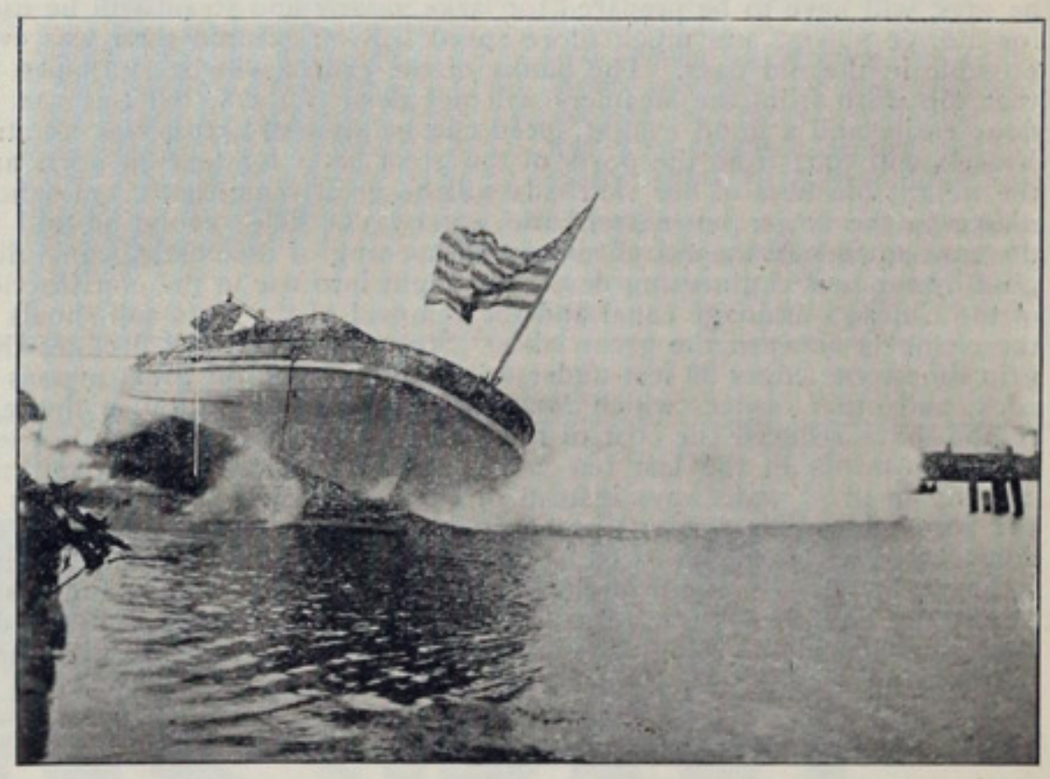
Name of vessel			PORTER	FOOTE
Date of trial			Feb. 10, 1897	June 25, 1897
Duration of trial			Five runs over a base of 11.972 nautical miles.	Two runs over base of 24. 5 nautical miles.
Place of Trial			Narragansett Bay	Chesapeake Bay
Condition of sea and wind			Smooth; light breeze	Smooth; light airs
Length on water line, feet			175	160
Beam, feet			17	16. 06
Draft, mean, on trial, feet			4. 79	5. 07
Displacement, tons			164	143. 9
Immersed midship section, sq. ft				58. 5
Coefficient of fineness, prismatic			.403	.387
Type of engines			Triple expansion, vertical	Triple expansion, vertical
Cylinder diameters in inches.	High pressure		16	12
	Int. pressure		22. 5	19. 25
	Low pressure		Two of 25	Two of 22
Stroke of piston, inches			16	16
Number and type of boilers			Three—Herreshoff	Two—Mosher
Length and diameter of boilers			10′ 6″ long, 10′ 8″ wide, 11′ 0″ high.	10′ 4″ long, 9′ 5″ wide, 11′ 5″ high.
Furnaces, number			Three	Two
Grate surface used on trial, sq. ft			156	95. 6
Heating surface used on trial, sq. ft			8, 010	5, 260
Condensing surface used on trial, sq ft			2, 282. 5	1, 600
Screw propeller	Diameter		5 ft. 4 in.	5 ft. 2 in.
	Pitch, mean		8. 75 ft.	8 ft.
	Area, developed, both screws		21. 38 ft.	14. 76 ft.
	Number of blades		Three	Three
Steam pressure pounds.	At engines, per gauge	Starboard. 196. 2	Port. 196	Starboard. 238. 8 / Port. 241. 7
	In first receiver, absolute	83. 0	74. 8	74. 4 / 82. 5
	In second receiver, absolute	16. 8	14. 4	13. 6 / 12. 6
Vacuum, condensers, ins. of mercury		23. 5	23. 0	22. 6 / 21. 6
Rev. of main engines, per minute		389. 95	389. 2	398. 13 / 393. 29
Speed per hour, in knots		28. 63		24. 53
Slip of propeller (mean), per cent		14. 87		21. 48
Air pressure in inches of water		2. 2		3. 78

Stock of Grain at Lake Ports.

The following table, prepared from reports of the Chicago board of trade, shows the stocks of wheat and corn in store in regular elevators at the principal points of accumulation on the lakes, Nov. 13, 1897:

	Wheat, bushels.	Corn, bushels.
Chicago	4,488,000	19,786,000
Duluth	2,904,000	803,000
Milwaukee	242,000	344,000
Detroit	360,000	151,000
Toledo	435,000	432,000
Buffalo	1,965,000	2,121,000
	10,394,000	23,637,000

As compared with a week ago, the above figures show, at the several points named, an increase of 2,068,000 bushels of wheat and a decrease of 288,000 bushels of corn. On the same date there was afloat on the lakes 1,757,000 bushels of wheat, 1,240,000 bushels of corn and 1,784,000 bushels of oats. Grain afloat on the canals aggregated 423,000 bushels of wheat, 396,000 bushels of corn and 282,000 bushels of oats.



A SNAP SHOT—OCEAN TUG ROBT. W. WILMOT LEAVING THE WAYS AT THE SHIP YARD OF F. W. WHEELER & CO., WEST BAY CITY, MICH.

New Station.

The new Twenty-third street station of the Pennsylvania Lines in New York is fast becoming popular with Cleveland people. The new cab service inaugurated by this line, with only a nominal charge, is what the people long have wanted. The 1:40 p. m. train from Cleveland has through sleepers to New York without change, and diner serving supper. This express train also makes quick time to Pittsburg, Baltimore, Washington and Philadelphia. For rates and full information call at City Ticket Office, 149 Superior street, Cleveland.

A lithographed wall map of Alaska showing the overland trails and all water routes to the Klondike gold fields will be mailed upon receipt of five 2-cent stamps. Address advertising department, the Nickel Plate road, Cleveland, O.

The Roman's Injuries.

The extent of injury sustained by the Menominee line steamer Roman, through striking on a bar outside Ashtabula Harbor while leaving that port in the blow of Thursday last, was not fully determined until the vessel was docked at the works of the Cleveland Dry Dock Co., after her coal cargo had been unloaded at Ashtabula. The ledge of rock on which the vessel struck has only a slight covering of sand, and as the whole weight of the ship and cargo was dropped onto the obstruction in a heavy sea, it is surprising that the result was not more disastrous. It is fortunate that the accident did not occur at a place where there would be difficulty in securing assistance, or where a harbor could not be reached in a hurry. As the bottom damage to the vessel is forward, under the foremast, and as it extends over only two or three plates and a few frames, it is quite probable that the massive hull "buckled up" immediately upon coming in contact with the rock, and then the reaction in the structure was so sharp and forcible as to cause the snapping of plates that came near breaking the vessel in two. The big fracture is in the starboard side of the vessel, just forward of hatch No. 4. Beginning at the hatch it runs full across the spar deck plating, then down the side almost in a straight line to the main deck, in the plating of which there is also a fracture, and then still further down the side through a but-strap and more plating to within a few feet of the bottom of the lower hold, where it turns and ends under a frame.

The upper part of this big fracture was at times open fully a quarter of an inch. Temporary repairs made at Ashtabula for the purpose of having the vessel undertake the short run to Cleveland consisted simply of angles and other strong pieces of steel placed over the fracture and secured to the vessel, both on the sides and on deck, so as to prevent spreading of the crack. Owners of the Roman will not be satisfied with putting in new plates and fixing up other damaged parts. They will compensate for the injury by giving her new features of strength. These will consist mainly of two new under-deck stringers, one on either side, running from bulkhead to bulkhead.

An Era of Ship Canals.

Hon John E. Russell of Massachusetts, who with President Angell of the University of Michigan and Lyman E. Cooley of Chicago was a member of the deep waterways commission appointed two years ago by President Cleveland, is now a ship canal enthusiast. President Cleveland selected Mr. Russell for this commission because of his business ability and familiarity, as secretary for five terms of the Massachusetts board of agriculture, with the transportation needs of the agricultural interests. As a result of investigations involved in the report which the commission submitted in January last, Mr. Russell avows his belief that an era of canal building is about to open and that railways are to be henceforth merely feeders of canals. When the railroad age began canals had been completed, were under construction, or were projected in such numbers that the map was a network of planned canal lines. The development of railroads stopped all these schemes and the day of canals seemed to be over. Now the situation will be to a considerable extent reversed. The main lines of traffic will be ship canals and the railroads will be the feeders to them. "It will be ridiculous," Mr. Russell thinks, "to see these oblong boxes called freight cars running about over the country with their little loads. There will, of course, be great use for them in winter business, but they will be to the canals in the open season what wagons have been to freight trains in the development of the railroad business." The canals, he says, will have to be prepared for large vessels and steam will be used for motive power, and much more speed will be secured than was ever possible in the old days. The banks of the canals will be riprapped so that the wash from the steamers will not destroy them, but this can be done easily and a good freight speed can be secured across the country. Vessels will start from the ports of the great lakes for foreign ports and the freight business of our railroads will be greatly increased, but subordinate to the larger business of the waterways. The revolution will be the consequence of the extraordinary cheapening of the cost of canal digging by the new engineering devices brought into use in the construction of the Chicago drainage canal and the removal of the reefs and shoals in the channels between the great lakes. Steam shovels, rock dredges that grip limestone ledges 20 feet under water and wrench off great masses of rock, and other devices which Mr. Russell saw in operation in the lake region, have reduced the cost of removing a cubic yard of rock not less than two-thirds in the last ten years. This cheapness will permit the digging of great waterways instead of the narrow and shallow canals of the past. The time is not distant, in his opinion, when canals will be constructed with a depth of 30 feet and a corresponding width, enabling large ocean vessels to be brought into the heart of the country and vastly promoting and cheapening transportation. The carrying capacity of the large vessels which will be used in the canals of the future will give them immense advantage over the freight cars.

More Big Liners Are Expected.

As almost all ships of the class to which the new Kaiser Wilhelm der Grosse belongs do their best after six or eight months of usage, it is more than probable that the big German steamer, which has already beaten the best performance of either the Campania or Lucania in a single day's run, will soon surpass all records on the Atlantic. Other transatlantic companies will accordingly be prompted to increase both the size and speed of their vessels. Increases in size and speed of ocean craft are commonly made by steps, rather than by leaps and bounds. The last two new ships of the Cunard company were, however, more than 5,000 tons larger than the two previous new vessels—the Etruria and the Umbria—and if new steamers were to be ordered by that company to enter into a competitive contest, they would probably be quite as much in advance of those that they now consider their largest as these were in advance of their predecessors. It would seem, therefore, that by the time the first decade of the coming century is ended we shall have steamers crossing the Atlantic that are at least 800 and possibly 1000 feet in length, and that these vessels will have a speed of at least 27 or 28 knots an hour, while it is not improbable that a speed of thirty knots an hour will be attained by them. A few years ago such an extraordinary rate of progress through the water would have seemed impossible, but with small craft it has been demonstrated that this railroad speed is easily possible, provided the power is well applied and there is an abundant supply of fuel. It is much more reasonable to assume that thirty knots will be made by ocean steamers twelve or thirteen years from now than it was to believe twelve or fifteen years ago that the speed of twenty-two knots an hour would be maintained by them. The improvements in the marine steam engine have been very great during the past ten or fifteen years, and yet what has been done is only a foreshadowing of what may be done in the future. Of course, these high rates of speed have only been obtained, and can only be obtained, by a liberal use of fuel, but apparently such an expense is thought to be offset if a vessel of immense tonnage can be driven at high rate of speed, because she has not only the carrying capacity needed to take in the coal, but she also provides the room for accommodating hundreds, and perhaps in the near future even thousands of passengers.

Cargo Records—Lake Freight Ships.

The Corrigan tow barge Amazon now holds the record among the big lake freighters as a wheat carrier. A cargo of wheat moved recently in this vessel from Fort William to Buffalo weighed out 205,572 bushels, or 6,167 net tons, which is three tons more than the record cargo of the steamer Empire City, moved from Duluth to Buffalo some time ago. The largest grain cargo of all, however, is that of the steamer Crescent City—225,000 bushels of corn, equal to 6,300 net tons, which was taken from South Chicago to Buffalo. The list of record cargoes follows:

Iron Ore—Schooner Amazon, owned by James Corrigan of Cleveland, 5,631 tons gross, or 6,307 net, Duluth to South Chicago, draft of 17 feet 1 inch; steamer Empire City, A. B. Wolvin of Duluth, 5,622 tons gross, or 6,296 net, Two Harbors to Cleveland, draft of 17 feet 2 inches; schooner Polynesia, James Corrigan of Cleveland, 5,477 tons gross, 6,134 net. Duluth to Fairport draft of 16 feet 8 inches.

Grain—Steamer Crescent City, A. B. Wolvin of Duluth, 225,000 bushels of corn, equal to 6,300 net tons, South Chicago to Buffalo, draft of 17 feet; schooner Amazon, James Corrigan of Cleveland, 205,572 bushels of wheat, equal to 6,167 tons, Fort William to Buffalo, 16 feet 8 inches draft; steamer Empire City, A. B. Wolvin of Duluth, 205,445 bushels of wheat, equal to 6,163 net tons, Duluth to Buffalo; steamer Crescent City, A. B. Wolvin of Duluth, 318,000 bushels of oats, equal to 5,088 net tons, Duluth to Buffalo.

Coal—Schooner Polynesia, James Corrigan of Cleveland, 5,654 net tons of bituminous, Cleveland to Duluth, 16 feet draft; schooner Aurania, John Corrigan of Cleveland, 5,187 net tons bituminous, Toledo to Milwaukee.

Winter Schedule on the Nickel Plate Road.

Commencing Sunday, Nov. 14, passenger trains will run as follows:

WEST BOUND.

No. 1. Leave Buffalo 12:40 noon; arrive Cleveland 7:30 p. m.; leave 7:50 p. m., arrive Ft. Wayne 2:40 a. m.; arrive Chicago 7:55 a. m. Time at stations east of Cleveland five minutes earlier than prior to Nov. 14.

No. 3. Leave Buffalo 11:45 p. m., as at present, and on same time at stations west to and including Ft. Wayne. At stations west of Ft. Wayne No. 3 will arrive a few minutes later than prior to Nov. 14, arriving Chicago 4:35 p. m.

No. 5. Leave Buffalo 5:35 a. m., same as before Nov. 14, and passes intermediate points, including arrival at Chicago, same time as before Nov. 14.

EAST BOUND.

No. 4. Leave Chicago 10:25 a. m., arrive Ft. Wayne 3:05 p. m., arrive Bellevue 6:25 p. m , arrive Cleveland 8:15 p. m. Depart from Cleveland 8:35 p. m., arrive Buffalo 1:35 a. m., arrive New York City 3:00 p. m., arrive Boston 5:25 p. m.

No. 6. Leave Chicago 2:00 p. m., arrive Ft. Wayne 7:10 p. m. Depart from Ft. Wayne 7:30 p. m., arrive Bellevue 11:35 p. m., arrive Cleveland 1:21 a. m., arrive Buffalo 6:50 a. m., New York 7:30 p. m., arrive Boston 10:30 p. m.

No. 2. Leave Chicago 10:15 p. m., and due at intermediate points east to Buffalo same as prior to Nov. 14; New York city, Boston and all points east at convenient hour the following morning.

The through car service will be maintained at the same high standard of efficiency as prior to Nov. 14, with an advantage to passengers on train No. 6, which will afford through sleeping car accommodations to New York city and Boston, reaching Boston 10:30 p. m., following evening. The standard of our dining car service will be maintained to that same efficiency as has characterized our past service.

Solid through trains with uniformed colored porters in attendance upon all coach passengers. No. 388, Nov. 18.

Lieut. Stafford, U. S. N., of the Cleveland branch hydrographic office, has secured the following information regarding the wreck of the schooner Groton, which foundered in Lake Erie, several days ago, while bound from Cleveland to Port Stanley with a cargo of coal: The wreck lies 9½ miles S. W. by W. from Port Stanley light and ½ mile S. E. of Talbot point in 40 feet of water, with 25 feet over the deck. Both masts are out of water with the foretopmast gone.

Charles L. Bell and W. L. Johnson of Middlesborough, England, who visited the Lake Superior mining country recently in company with Messrs. J. H. Wade, E. W. Oglebay, Capt. Thomas Wilson and other Cleveland owners of mining property, are relatives of Sir Lowthian Bell and have large iron and steel interests in England. Their object in visiting this country was to investigate for themselves our resources and manufacturing facilities in the iron and steel industry.

Luce's "Seamanship" has been a text-book at the United States naval academy for the past thirty years. It is being used by naval reserve organizations all over the country. It is a standard work, selling at $10, and will be mailed to any address at that figure by the Marine Review, 409 Perry-Payne building, Cleveland.

The Bessemer Steamship Company

Solicits Catalogues, Prices and Discounts from manufacturers and wholesale dealers in Ship Machinery, Brass Goods, Rope, Paints, Asbestos, Packing, Hose, Furniture, Piping, Glass and Crockery, Tinware, Ranges, Carpeting, Bedding, Life-preservers, Rafts and Boats, Engineers' Supplies and Tools, Carpenters' Tools, Electric Supplies, Lamps, Grate Bars, Castings, etc., etc., etc.

ALSO QUOTATIONS from Market men and Grocers on the Lakes for Provisions and Meat, best quality only.

CATALOGUES without quotations are not wanted.

ALL GOODS except provisions to be delivered in Cleveland.

Address L. M. BOWERS, General Manager,
CLEVELAND, OHIO.

Chas. E. & W. F. Peck,

58 William St.
NEW YORK CITY.

812 Royal Insurance Building.
CHICAGO, ILL.

C. T. BOWRING & CO.,
5 & 6 Billiter Ave., E. C.
LONDON, ENG.

INSURANCE.

BROWN & CO.,
202 Main St.,
Buffalo, N. Y.

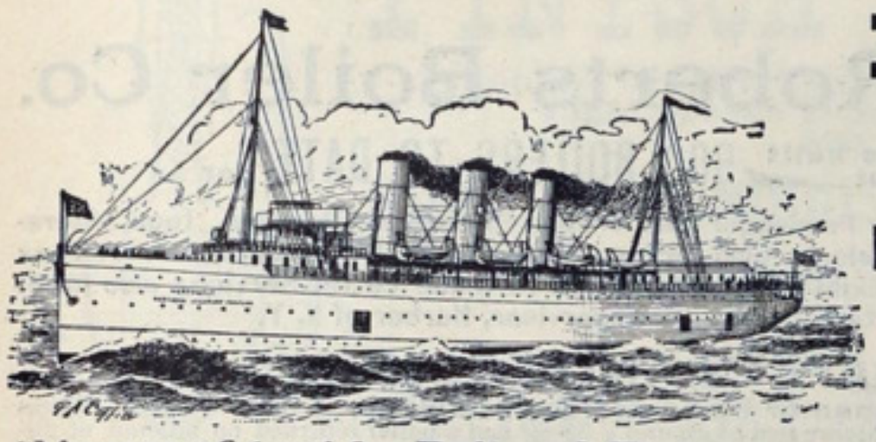
J. G. KEITH & CO.,
138 Rialto Bldg.,
Chicago, Ill.

LA SALLE & CO.
Board of Trade Bldg.,
Duluth, Minn.

Are prepared to make rates on all classes of Marine Insurance on the great lakes, both CARGOES and HULLS.

"GREAT LAKES REGISTER."

F. D. HERRIMAN, Surveyor-General, Chicago, Ill.



Shippers of Coal by Rail and Water.

RAPID FUELING DOCKS, DETROIT RIVER.

JAMES GRAHAM & CO.,

Foot Twenty-first St., Detroit, Below Routes of Passenger and Car Ferry Lines.

Pockets and Chutes arranged for different types of vessels.

BEST STEAM COAL. Large Supplies and every effort to give dispatch, day and night. Wide stretch of river for tows, and plenty of water at dock at all times.

Office 1005 Chamber of Commerce. Phone 2083.

JOHN GORDON. J. H. KELLERAN. H. L. CHAMBERLIN.

JOHN GORDON & CO.

VESSEL, FREIGHT AND INSURANCE AGENTS,
1132 Guaranty Building, BUFFALO, N. Y.

Newport News Shipbuilding & Dry Dock COMPANY.

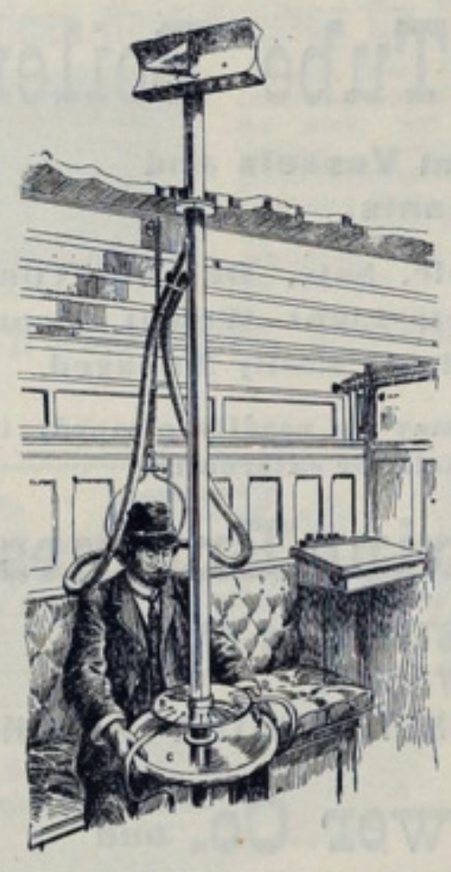
WORKS AT NEWPORT NEWS, VA.
(On Hampton Roads.)

Equipped with a Simpson's Basin Dry Dock capable of docking a vessel 600 feet long, drawing 25 feet of water, at any stage of the tide. Repairs made promptly and at reasonable rates.

SHIP AND ENGINE BUILDERS.

For estimates and further particulars, address

C. B. ORCUTT, Pres't,
No. 1 Broadway. New York.



AN AID TO NAVIGATION

that prevents grounding or collision in a fog,

THE EOPHONE,

MANUFACTURED AND INSTALLED BY THE

EOPHONE CO.
BOWLING GREEN BLDG., NEW YORK.

It accurately locates the place from whence the sound comes, and shows its bearing on a dumb compass. It has been adopted by the U. S. Navy and is in practical service on many coast steamers.

This instrument will prove especially valuable in lake navigation on account of the frequency of fogs and thick weather.

ELLIS & EAVES DRAFT

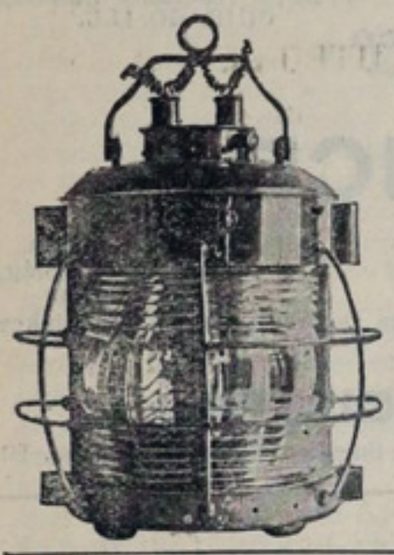
THE GLOBE IRON WORKS COMPANY, CLEVELAND, O.

SOLE MANUFACTURERS AND AGENTS FOR THE GREAT LAKES.

THE PRICE PAID FOR CARRYING ORE during the past few months of this season was so near the COST OF CARRYING IT, that in order to keep even, every economy that was thought of was practiced. One means of economy was neglected in nearly every case. That was the possibility of reducing fuel consumption. This can be done by equipping your steamer with the Ellis & Eaves induced draft and Serve's ribbed tubes.

THE GLOBE IRON WORKS COMPANY, Cleveland, O., manufacturers for the Great Lakes.

MARINE LAMPS



Oil and Electric Equipment for Steamships, Yachts, etc.

Signal Lights, Saloon Fixtures, Cabin Lamps, Lanterns, etc.

Wm. Porter's Sons,

271 Pearl St., NEW YORK CITY.

INCORPORATED 1794.

Insurance Company of North America.

CAPITAL, Paid up in Cash, - - $3,000,000.00
ASSETS, . - - - - - - - - 9,686,808 08

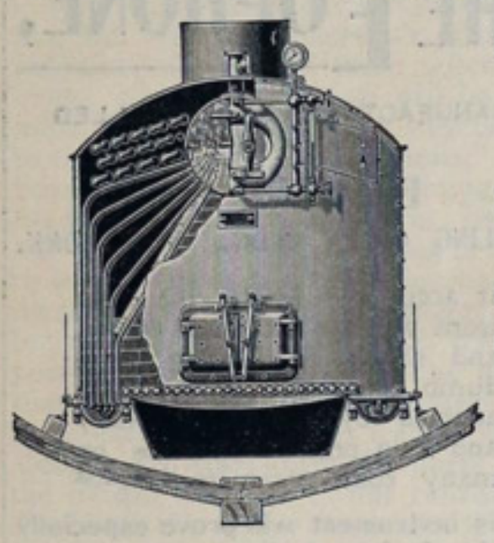
CHARLES PLATT, President. GREVILLE E. FRYER, Sec'y. & Treas.
EUGENE L. ELLISON, Vice-President. T. HOWARD WRIGHT, Marine Sec'y.
JOHN H. ATWOOD, Assistant Secretary.

Lake Marine Department.

GEORGE L. McCURDY, Manager
CHICAGO, ILLS.

SEABURY'S
Safety Water Tube Boiler

For all types of Steam Vessels and Stationary Plants.



Reliable, Safe, Durable, Compact, Light Weight, Economical, Easily Managed.

Tubes may be readily cleaned, internally or externally.

Marine Engines,

STEAM and SAIL YACHTS,
THE ONLY NAPHTHA LAUNCH.

Gas Engine & Power Co. and Charles L. Seabury & Co. Consolidated.

MORRIS HEIGHTS, NEW YORK CITY.

G. H. FOSTER, Prest. MARK H. HANLON, V.-Prest. & Secy. W. H. WARNER, Treas.
DAVID BARNHISEL, Gen'l Mgr.

The Inter-Ocean Coal & Coke Co.

General office, 513 Perry-Payne Bldg., Cleveland.

PRODUCERS AND SHIPPERS.

Choicest Grades of YIOUGHIOGHENY COAL
FOR STEAMBOAT FUEL.

Lighter in Cleveland Harbor of 400 tons capacity.

CLEVELAND DOCKS, just north of Main Street bridge.
SAULT RIVER DOCK at Sault Ste Marie, ¼ mile below the locks.

The Roberts Boiler Co.

Have built about 900 BOILERS TO DATE for

Launches, Yachts, Passenger and Freight Steamers, Dredges, Tugs, Stern-Wheelers, Canalers; also for Navy Department, War Department, Treasury Department, Light-House Board and Revenue Cutter Service; also for N. Y. Dock Department and U. S. Supervisor, Harbor of N. Y.

SAFETY AND ECONOMY.

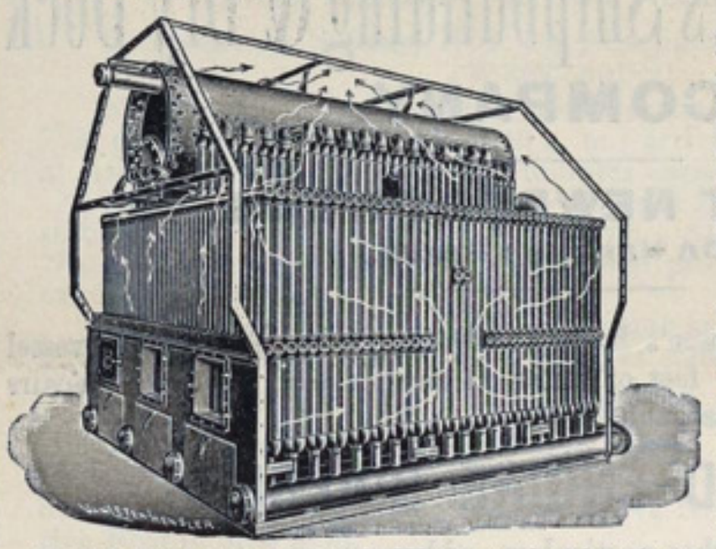
Never killed a man or had a serious accident. $250,000 capital. Works covering 29,000 square feet of ground. Never had a boiler returned on account of dissatisfaction. Every Boiler Warranted. All material made specially for our use. All boilers tested at 500 pounds hydrostatic pressure and 250 pounds of steam before shipping. Workmanship strictly first-class. All joints screwed and reliable. No expanded joints. State your requirements and we will furnish specifications. Correspondence solicited.

THE ROBERTS SAFETY WATER TUBE BOILER CO.,

39 and 41 Cortlandt Street, New York City.

Works, Red Bank, N. J.

TAYLOR PATENT UPRIGHT WATER TUBE BOILER.



Chief Engineer Skelton of Steam Yacht Enquirer writes: "I can honestly say, that the Taylor boiler is the best boiler I ever handled, and I have been in the business 18 years. It is light on fuel, carries steady water line and steam is dry. You can refer any person to me wishing to inquire into the merits of the Taylor boilor, for she is a dandy."
(Signed) WILLIAM SKELTON, Jr.

The Taylor boiler is in the three fastest boats of their respective classes on fresh water, viz., Yacht Enquirer of Buffalo, W. J. Connors owner; in a 29½ miles race with Say When made 18.78 miles per hour; Yacht Azalia, late Edward Henkel owner, in a race with the fast Side-Wheel Steamer Frank E. Kirby, 1896, made 18 miles per hour; Launch Dream, 63 feet long, 9 feet beam, with only 350 square feet heating surface, makes 17 miles per hour.

MANUFACTURED BY
DETROIT SCREW WORKS, DETROIT, MICH, U.S.A.

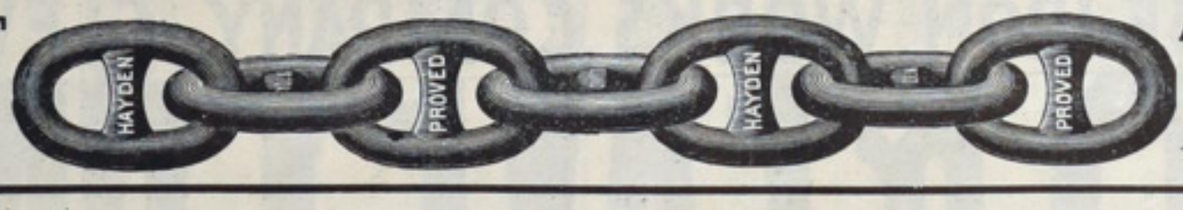
ROBERT CURR, SURVEYOR OF IRON & STEEL HULLS,

Plans and Specifications furnished.

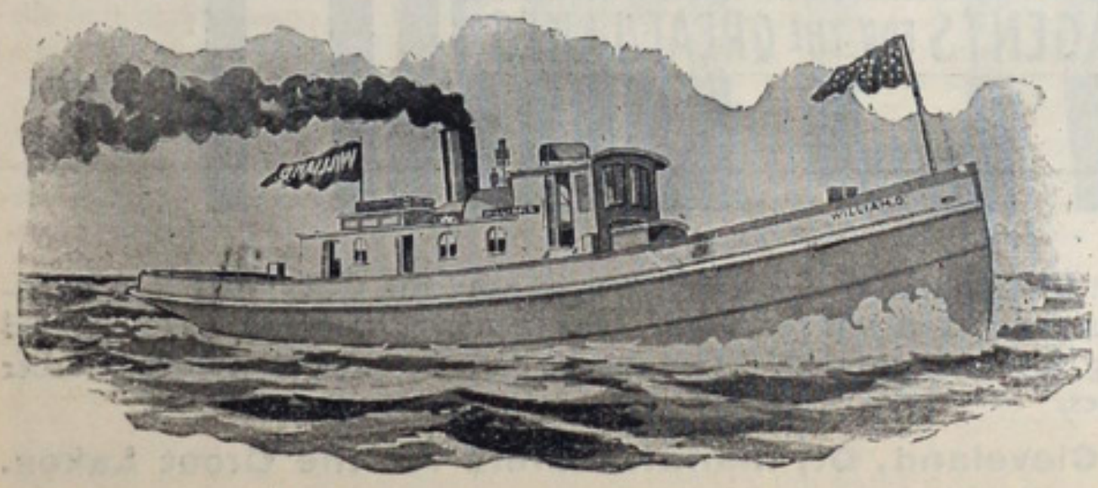
409 Perry-Payne Bldg. Telephone 472. CLEVELAND, O.

Chain Department ✻ P. HAYDEN S. H. CO. ✻ Columbus, Ohio.

Our Chain in use on the Largest Steamers on the Lakes:
The Zenith City, Victory, North West and North Land, and many others.



All kinds of Chain—
Stud and Close Link,
Cable Chains.
Write for Prices.



C. E. GROVER, Prest. W. A. COLLIER, Sec. & Treas.
D. R. HANNA, V. Prest. CAPT. PHILIP SHIED, Marine Supt

The Ashtabula Tug Co.

MAIN ST. BRIDGE,
CLEVELAND, O.

Incorporated.
W. A. COLLIER, Gen. Mgr.

CLEVELAND, Tel. 409. ASHTABULA, Tel. 149.

CHICAGO.

BARRY BROS.

Independent Tug Line.

TUGS

Rita McDonald, Crawford, C. M. Charnley, D. P. Hall, Ira O. Smith.
Wm. Dickinson, W. H. Wolf, Welcome, Commodore, Jack Barry.

Office, 240 South Water Street,

Telephone Main 273.

3 long whistles call our tugs.

DULUTH.

BARRY

Towing & Wrecking Co.

TUGS.

G. A. Tomlinson.
Industry,
Violet H. Raber,
Prodigy.

Office, foot of 5th Ave., West.

Telephone 544.

3 long whistles call our tugs.

IF YOU PAY MORE

Than we charge for Steamer Signals you pay too much. Get the best and avoid collisions.

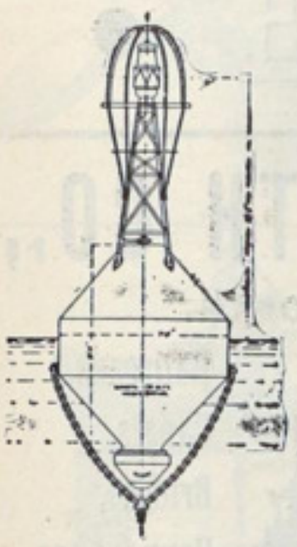
THE BUFFALO FLUTED LENS SIGNALS

are the best. Perfect in color and construction. Every lamp guaranteed. Manufactured only by

RUSSELL & WATSON,

BUFFALO, N. Y.

Sold by H. D. Edwards & Co., Upson-Walton Co., G. B. Carpenter & Co.



PINTSCH GAS LIGHTED BUOYS

Adopted by the English, German, French, Russian, Italian, and United States Light House Departments, for Channel and Harbor Lighting; over 500 gas buoys and gas beacons in service.

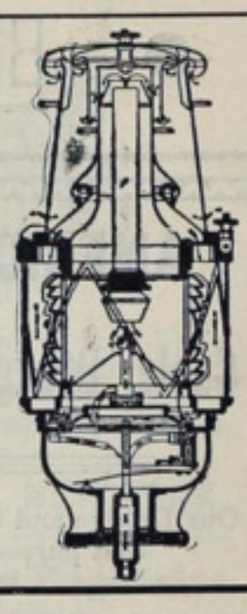
BURN CONTINUOUSLY from 80 to 365 days and nights without attention, and can be seen a distance of six miles.

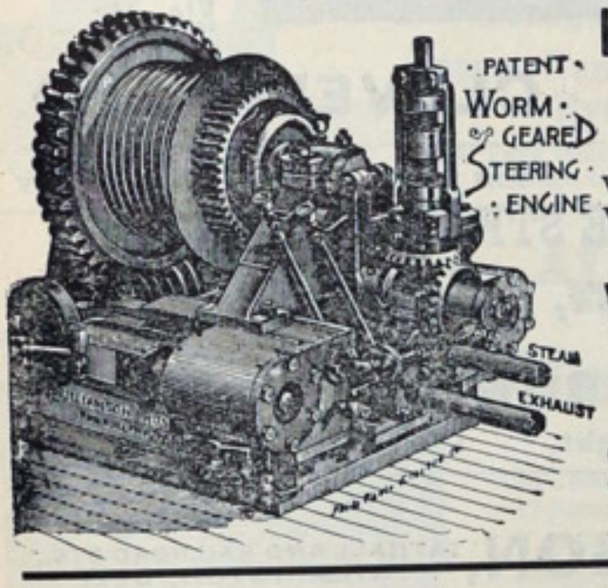
Brilliant and Steady Illumination. Economical and Reliable in Operation.

CONTROLLED BY THE

Safety Car Heating & Lighting Company,

160 BROADWAY, NEW YORK CITY.





Hoisting and Steering ENGINES.

With either Frictional, Spur or Worm Gear of various patterns to suit all purposes.

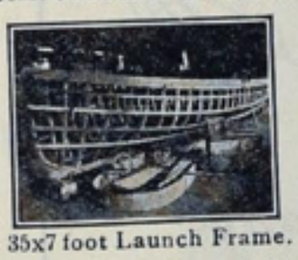
Williamson Bros.

Richmond and York Sts

PHILADELPHIA, PA.

Over 150 of the largest and most modern lake steamers have our steerers.

American Boat Building Co. Incorporated.



35x7 foot Launch Frame.

Knock-Down Boats, something new. We do the work, you nail together. Freight low, prices reasonable. Also completed Boats, Half-Raters. Knock-Abouts and Canoes. Send stamp for catalogue.

3517-21 S. Second Street, ST. LOUIS, MO.

Queen City Hydraulic Steerer.

Best and Most Powerful Steerer

FOR TUGS, STEAMERS, ETC.

Price—From $650 to $750, according to size and location in steamer.

Manufactured by

QUEEN CITY ENGINEERING CO., Buffalo, N.Y.

O. S. Richardson Fueling Co.

FUELING DOCKS:
NORTH PIER
18TH STREET BRIDGE,
ILLINOIS CENTRAL SLIP "C"

STORAGE DOCKS FOR ANTHRACITE:
KINGSBURY ST. BETWEEN INDIANA & ERIE STS.
ELSTON AVE.-DIVISION ST. BRIDGE, (NORTH BRANCH)
NORTH AVE. BRIDGE.
DIVISION ST. BRIDGE, (OGDEN CANAL)
SOUTH HALSTED ST. BRIDGE.

COAL

OFFICE,
225 DEARBORN ST.
CHICAGO.

Lake Carriers' Oil Company,

JOHN CORRIGAN, MANAGER,
720 PERRY-PAYNE BLDG.,
CLEVELAND, O.
Warehouse, 235 Merwin Street.

MANUFACTURERS OF

LAKE CARRIERS' CYLINDER OIL

No. 1 and No. 2,

Engine Oil, Lard Oil, Tallow and Cup Grease.

FOR SALE BY
BARRY BROS., Duluth and Chicago.
J. P. NAGLE, Toledo, O.
C. H. McCUTCHEON, Buffalo, N. Y.
W. S. McKINNON, Ashtabula Harbor, O.

JOHN HAUG,

Consulting Engineer and Naval Architect.

Ship and Engineer Surveyor Lloyds Register, London.
Plans, Specifications and Superintendence of Ships and their Machinery.
specialties—Bulk Oil Vessels High Speed Yacht Engines, etc.

206 Walnut Place, Philadelphia.

P. M. CHURCH & CO.,

SAVINGS BANK BLOCK, SAULT STE. MARIE, MICH

LEADING DEALERS IN

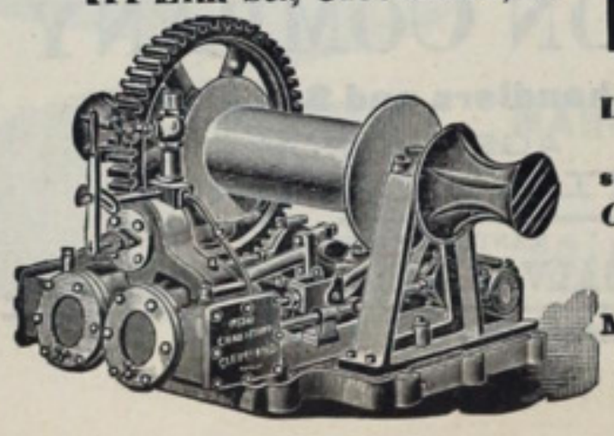
Ship Chandlery,

Marine Hardware, Paints, Oils, Packings, Cordage, Etc.

FIRST-CLASS COPPERSMITH AND TINSHOP IN CONNECTION.

The Chase Machine Co.

111 Elm St., Cleveland, O.



MACHINISTS and ENGINEERS

MANUFACTURERS OF

Land and Marine Engines and Steam Pumps,

SOLE OWNERS AND MANUFCTURERS OF

Chase Fog Whistle Machine.

Over 150 in use on the best class of Lake Steamers.

Special Attention given to

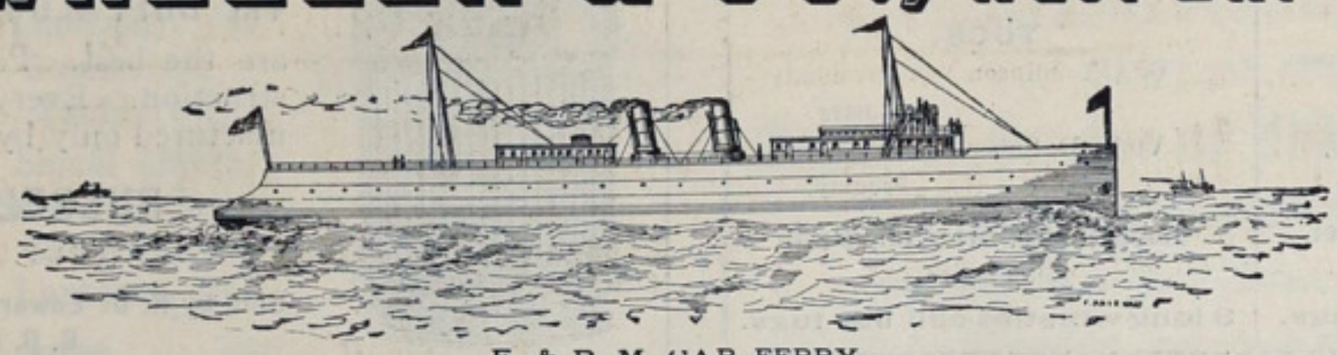
MARINE REPAIR WORK.

Engineers' Supplies.
Asbestos Pipe and Boiler Covering.

TELEPHONE 994.

F. W. WHEELER, President. H. T. WICKES, Vice-President. C. W. STIVER, Secretary. JNO. S. PORTER, Treasurer.

F. W. WHEELER & CO., West Bay City, Mich.



F. & P. M. CAR FERRY.

Builders of all kinds of METAL AND WOODEN SHIPS.

AMERICAN CHAIN CABLE WORKS.

ESTABLISHED 1865.

Cable, Dredge, Quarry, Shipping, Crane and Rafting

CHAINS.

Our Dredge and Crane Chains are made of Iron Rolled Specially for that purpose in three qualities, "Burden's," "H. B. & S." iron, and "Burden's Best Best" iron.

THE J. B. CARR COMPANY, TROY, NEW YORK.

The Martin-Barriss Co.

IMPORTERS AND MANUFACTURERS OF

Mahogany, White Mahogany,

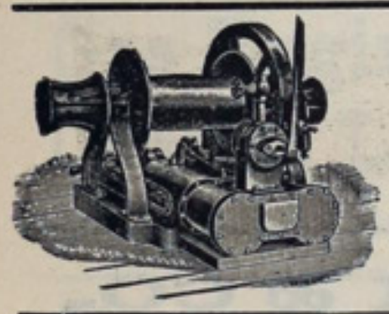
AND ALL NATIVE CABINET WOODS.

HIGH GRADES OF KILN DRIED WOODS FOR CABIN WORK AND INSIDE TRIM.

White Oak Timbers and Plank

CONSTANTLY ON HAND AND SAWED TO ORDER ON SHORT NOTICE.

654 Seneca Street, Cleveland, Ohio.



DOCK and DECK HOISTS

ALL KINDS OF

Machinery & Friction Hoists.

SEND FOR PRICES AND CIRCULARS.

JACKSON & CHURCH, SAGINAW, MICH.

HOWARD H. BAKER & CO.

Ship Chandlers and Sail Makers,

18 to 26 Terrace. BUFFALO, N.Y.

H. CHANNON COMPANY

Ship Chandlers and Sail Makers.

AGENTS FOR

RYLANDS BROS.

MANUFACTURERS OF

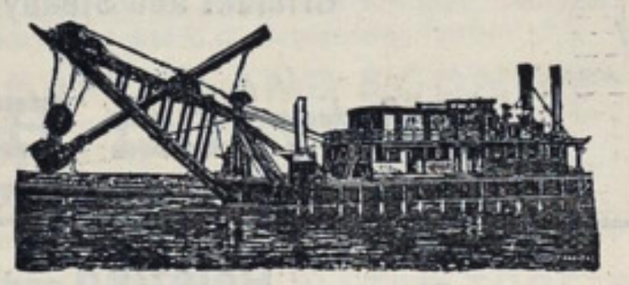
ENGLISH GALVANIZED STEEL HAWSERS,

94-26 Market Street, CHICAGO, ILL

THE L. P. & J. A. SMITH CO.,

Contractors of Public Works.

Dredging, Pile-Driving, Breakwaters, Dry Docks and Pier Building,



Railroads, Canals, Bridges, Foundations, Etc., etc.

23 River St., CLEVELAND, O.

H. E. STEVENS. TOM MEAD. LEW PRESLEY

BUCKEYE STEAM FITTING CO.

Steam Fitters, Engineers Supplies,

Phone 4058. AGENTS FOR

RAINBOW PACKING.

Open Day and Night. 117 River St., CLEVELAND, O.

THOS. DREIN & SON, TATNALL AND RAILROAD STS., WILMINGTON, DEL.

Builders of Metallic Life Boats and Rafts, Yachts and Pleasure Boats, Life Preservers. Outfit for Lake Steamers a Specialty.

For Sale

STEAMER AND TWO CONSORTS.

Combined capacity 6000 tons iron ore on 17 feet draft.
All in fine condition, being practically new.
Can be purchased at low price and on easy terms.
Tow suitable for lumber.

For information write,

MARINE REVIEW,
409 Perry Payne Bldg.
Cleveland.

$350.00 WILL BUY

Two Propeller Engines 12x14 with Slide Valves, Cranks and all connections complete; three Propeller Wheels, 65 inches in diameter, 60 feet of 4-inch Shafting with Couplings and Cranks.

E. W. DURANT, Stillwater, Minnesota. Nov. 18.

DIXON'S Graphite Pipe Joint Compound

Enables you to MAKE A TIGHTER JOINT than you can possibly make with red lead. You can do it easier, and parts can be separated at any time without breaking anything. Send for sample and circular.

JOS. DIXON CRUCIBLE CO., JERSEY CITY, N. J.

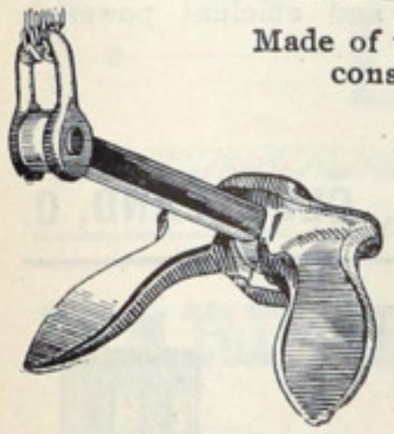
DIXON'S Lubricating Graphite

Is fully explained in an INTERESTING AND INSTRUCTIVE PAMPHLET which is FREE to all interested. It will pay all Engineers and Machinists to SEND FOR IT.

JOS. DIXON CRUCIBLE CO., JERSEY CITY, N. J.

Fred'k Baldt, President. W. M. Gelston, Vice-President
W. S. Bickley, Sec'y and Treas,

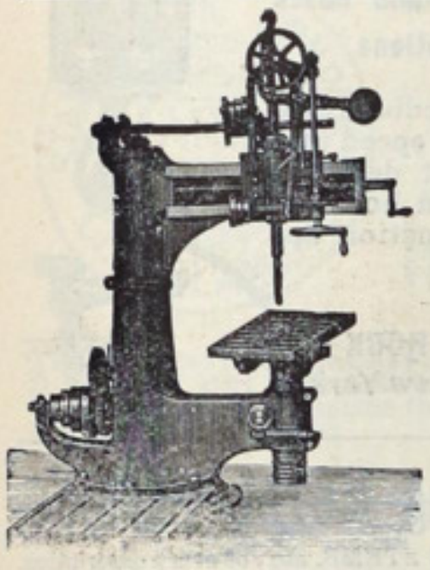
Baldt Patent Stockless Anchor.



Made of the finest quality of open-hearth steel and constructed on the ball and socket principle.

Many points of superiority over ordinary Stockless Anchors.

BALDT ANCHOR COMPANY,
CHESTER, PA.
WALTER MILLER, Western Reserve Bldg., Cleveland, Ohio,
Representative for the Great Lakes.
☞ New catalogue containing valuable tables sent on application.



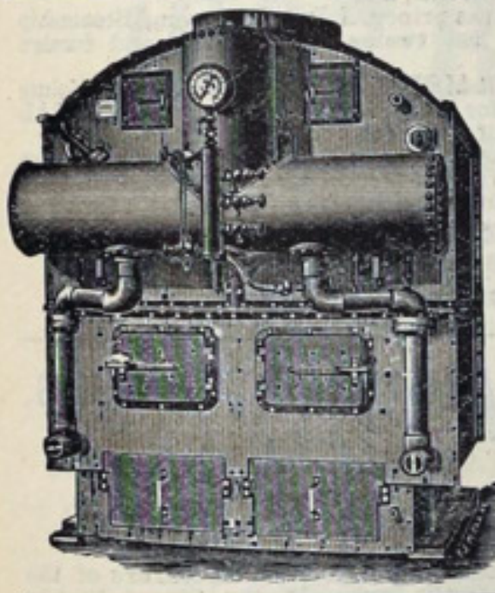
Bement, Miles & Company,

PHILADELPHIA, PA.
MANUFACTURERS OF
Metal Working Machine Tools

For Ship Yards, Railroad Shops, Locomotive and Car Builders, Machine Shops, Rolling Mills, Steam Forges, Boiler Shops, Bridge Works, etc., etc.

Steam Hammers, Steam and Hydraulic Riveting Machines.

New York Office: Taylor Bldg. No. 39 Cortlandt St.
Chicago Office: 1534 Marquette Building.



ALMY'S PATENT
SECTIONAL
Water-Tube Boilers.

NOW USED IN
16 Passenger Boats from 70 to 160 feet long.
27 Steam Yachts from 50 to 160 feet long.
U. S. Torpedo Boat "Stiletto."
Numerous Small Launches and Stationary Boilers are giving most excellent results.

ALMY WATER-TUBE BOILER CO.,
No. 178-184 Allens Avenue, near Rhodes St.
PROVIDENCE, R. I.

VANDUZEN Steam JET PUMPS

THE BEST IN THE WORLD.
Pumps any kind of Liquid. Always in order. Never clogs nor freezes. Fully Guaranteed. COST $7 AND UPWARD. Especially useful for Mines, Quarries, Pits, Wells, Clay Pits, Breweries, on Steamships, Ferryboats, Sugar Plantations, etc. A full stock always on hand.

Descriptive Catalogue and Prices furnished Free. **THE E. W. VAN DUZEN CO., Cincinnati, O.**

For Stationary, Portable, Traction Engines, Tugboats, &c.
Thoroughly Reliable—Perfectly Automatic.
JENKINS BROS., - Selling Agents,
NEW YORK, BOSTON, PHILA., CHICAGO.

SIMPLE, STRONG and RELIABLE.

Changed from Steam to Hand by one Lever in Less Than One Second

No. 8 **BECK** Patent Steam and Hand **STEERING GEAR.**

BUILT BY
Pawling & Harnischfeger,
MILWAUKEE, WIS.

Chas. Corv & Son

Manufacturers of the
Mechanical and Electric Marine Telegraph,

Electrical Helm Indicators
Electric Call Bells.

Engine Bells and Brass Work of all descriptions, Shrieking and Siren Whistles.

278 DIVISION ST., NEW YORK CITY.

Alfred B. Sands & Son
YACHT PLUMBERS,
AND MANUFACTURERS OF
YACHT PLUMBING SPECIALTIES.

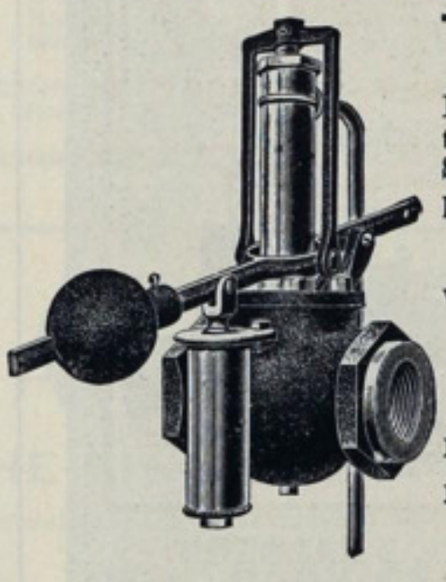
Patent applied for.

The only pump water closet in the world so constructed as to be positively free from danger of flooding.

Folding Lavatories, Pumps, Ventilators, Etc., Etc.

134 Beekman St., NEW YORK.

The "DAVIS" Pressure Regulator and Reducing Valve.



Is the simplest and best for reducing the pressure to Steam Steering Engines, Donkey Engines, Steam Winches and all places requiring a uniform pressure below that of boilers.

No diaphragms, spring or packing.

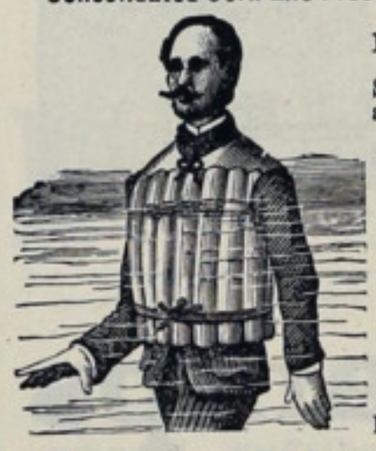
Cut shows ball weight. We can furnish scale weights if preferred.

MANUFACTURED BY
G. M. DAVIS & CO.
106 N. Clinton St., CHICAGO, ILL.
FOR SALE BY
R. E. Hills, Chicago. C. H. McCutcheon, Buffalo
Geo. Worthington Co., Cleveland.
P. M. Church, Sault Ste. Marie. Jas. Walker & Son, Detroit
Jas. Clements & Son, Bay City, Mich.
Cleveland Ship Building Co., Cleveland.
Chicago Ship Building Co., Chicago.

Selling agents—The McIntosh-Huntington Co., Cleveland, O.; The Detroit Sheet Metal and Brass Works, Detroit, Mich.

NEVERSINK CORK JACKET AND LIFE BELT.

Warranted 24 lb. Buoyancy and full Weight of Cork, as required by U. S. Inspectors
Consolidated Cork Life Preservers. Superior to all others. **Ring Buoys and Fenders.**

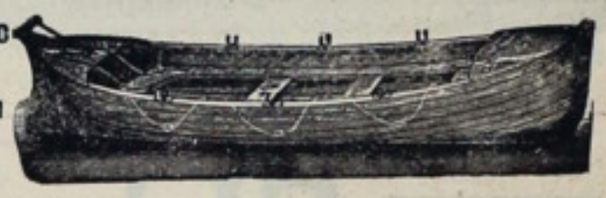


SAFEST, CHEAPEST. Approved and adopted by U. S. Board of Supervising Inspectors.

Also adopted by the principal Ocean, Lake and River Steamer Lines as the only Reliable Life Preserver. Vessels and the trade supplied. Send for catalogue.

Awarded four Medals by World's Columbian Exposition

Metallic and Wooden Life Boats.



Metallic Life Rafts, Marine Drags.

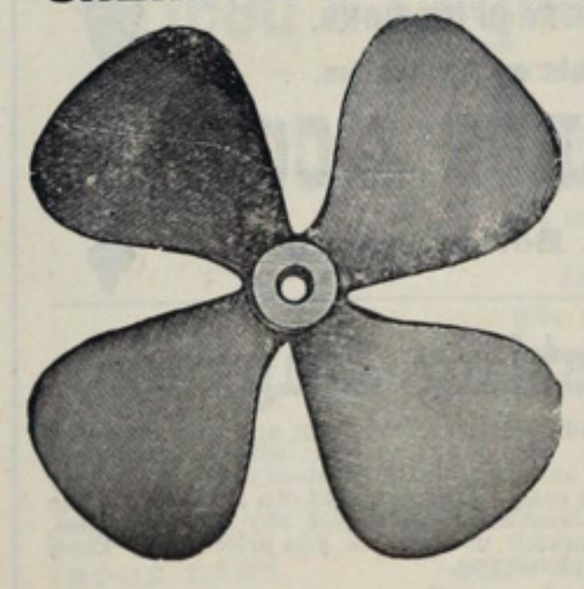
Manufacturer of Woolsey's Patent Life Buoy, which is the lightest, cheapest and most compact Life Raft known.

Send for Illustrated Catalogue.
Get our prices before buying elsewhere.

D. KAHNWEILER,
437 Pearl Street, NEW YORK CITY.

SHERIFFS MANUFACTURING COMPANY,

Manufacturers of



Propeller Wheels.

MARINE ENGINES AND REPAIRS.

Milwaukee, Wis.

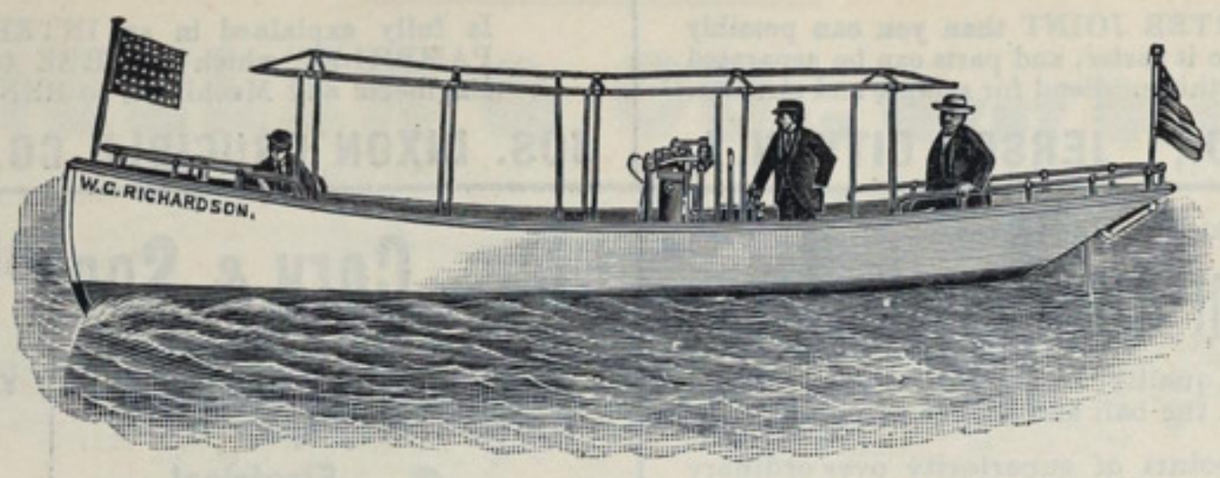
TELEPHONE S.—163.

The Wootters Gas Engine.

Especially adapted for launches and ferry boats. Fitted with friction clutch or reversible shaft.

These engines are giving entire satisfaction in the pleasure yacht W. C. Richardson and the delivery launch Lotta.

Prices and particulars furnished on application.



Suitable for all purposes requiring from 1 to 200 horse-power, with the lowest possible expenditure.

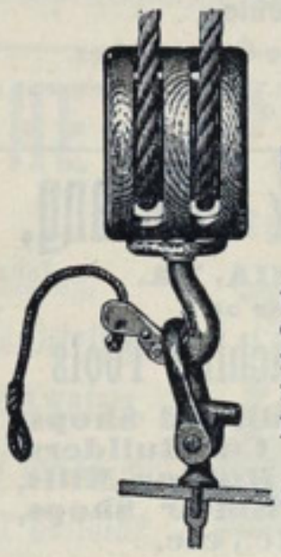
Engines of the stationary type built for every purpose where a reliable and efficient power is required.

NAPHTHA LAUNCH W. C. RICHARDSON,(Engine 8 horse power—speed 8 miles an hour.)

BUILT BY THE . . . . . McMYLER MFG. CO., GAS ENGINE DEPARTMENT, 180 Columbus St., CLEVELAND, O.

THE
Swain Wrecking Co.
E.M.PECK, Prest

The TUG FAVORITE
STATIONED AT CHEBOYGAN, MICH. WITH COMPLETE WRECKING OUTFIT IN CHARGE OF
Capt. P. L. Millen
CANADIAN WRECKER SAGINAW
STATIONED AT DETROIT, MICH. ENABLES US TO WRECK IN CANADIAN WATERS.
STEAM PUMPS AND SUB-MARINE WORK IN CHARGE OF JOHN S. QUINN.
Address all communications to
PARKER & MILLEN.
OFFICE 15 ATWATER ST. WEST DETROIT, Mich.
WRECKING TUG FAVORITE
FAVORITE
4 STEAM PUMPS, 10 JACKS, 3 HAWSERS.
1 COAL and ORE PUMP
3-12 INCH ROTARY.
1-14 INCH WORTHINGTON.
10-100 TON JACKS
1-12 INCH HAWSER.
1-10
1-9
DIVING RIGS AND DIVERS ABOARD AT ALL TIMES
Telegraph
Capt. P. L. Miller
CHEBOYGAN, MICH.
TELEGRAPH
PARKER & MILLEN,
DETROIT, MICH.

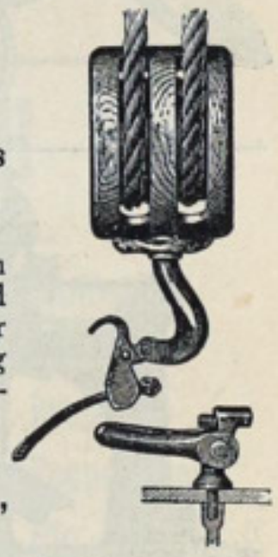


STANDARD AUTOMATIC RELEASING HOOK

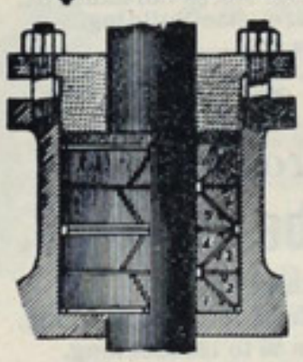
For NAPTHA LAUNCHES and boats of all sizes and descriptions.

Will release a boat immediately in the roughest sea or under speed and can be hooked on without delay or injury to the hands of men hooking it on. For further information apply to

STAND'T AUT. RELEAS'G HOOK CO.,
22 and 24 State Street, New York.



KATZENSTEIN'S Self-Acting METAL PACKING,



For PISTON RODS, VALVE STEMS, etc., of every description, for Steam Engines, Pumps, etc., etc.

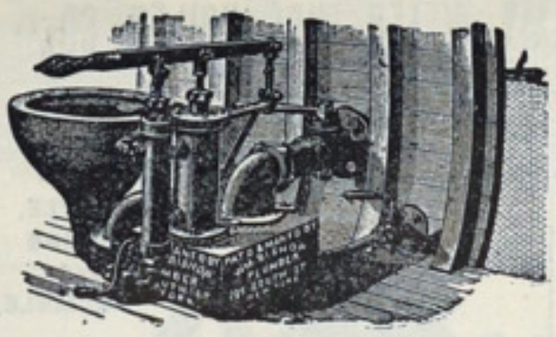
Adopted and in use by the principal Iron Works and Steamship Companies, within the last twelve years, in this and foreign countries.

FLEXIBLE TUBULAR METALLIC PACKING, for slip-joints on Steam Pipes, and for Hydraulic Pressure; also METAL GASKETS for all kinds of flanges and joints.

DOUBLE-ACTING BALANCED WATER-TIGHT BULKHEAD DOORS for Steamers. Also Agents for the McColl-Cumming PATENT LIQUID RUDDER BRAKE. For full particulars and reference, address:

L. KATZENSTEIN & CO.,
General Machinists, Brass Finishers, Engineers' Supplies,
357 West St., New York.

PATENT PUMP WATER CLOSET.



For Yachts, Naval Ships, Etc.

WM. BISHOP'S SONS,

PLUMBING and STEAM FITTING

"MARINE SPECIALTIES."

Patentees and Manufacturers of the only Pump Water Closet that is safe below water line.

BRASS AND COPPER PUMPS, LAVATORIES, ETC.

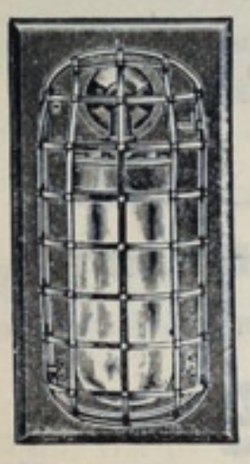
205 South St., - New York.
724 Third Ave., Brooklyn, N.Y.
Telephone.

MIERS CORYELL

21 E. 21st Street, NEW YORK.

Consulting Mechanical Engineer,

Plans, Specifications and Superintendence. Marine and Water Works Engines and Boilers.



Ship Lamps

OIL AND ELECTRIC FIXTURERS

— FOR —

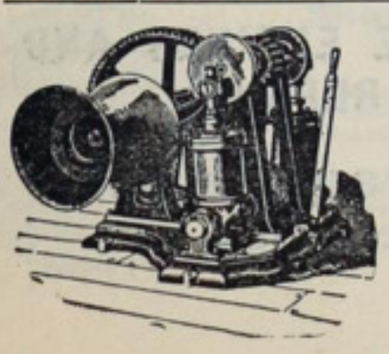
Steamships, Yachts, &c.

GREAT VARIETY OF DESIGNS.

Prices and Cuts on Application.

PAGE BROS. & CO.

347 to 357 Cambridge St. Boston, Mass.



Hoisting Engines.

We build them in all sizes from new and improved designs. Every engine thoroughly tested before leaving our shop, and guaranteed to be satisfactory in every case. When in want of a Hoist for marine work, dock work, mining or any other purpose, kindly permit us to name you prices. We know we can please you.

Marine Iron Co., **Bay City, Michigan.**

'96 JENKINS '96

Is the Perfection of Joint Packing, Instantaneous, Does not Squeeze out and not necessary to follow up joint. We guarantee it to last for years on any and all pressures of steam or any kind of joint where packing is required. ***Does not rot, burn or blow out,*** therefore the best for all purposes. Call for and insist on having '96 JENKINS '96 stamped like cut.

JENKINS BROS. New York, Boston, Philadelphia, Chicago.

C. H. McCUTCHEON,

(SUCCESSOR TO SAMUEL MCCUTCHEON,)

Copper, Tin and Sheet Iron Manufactory

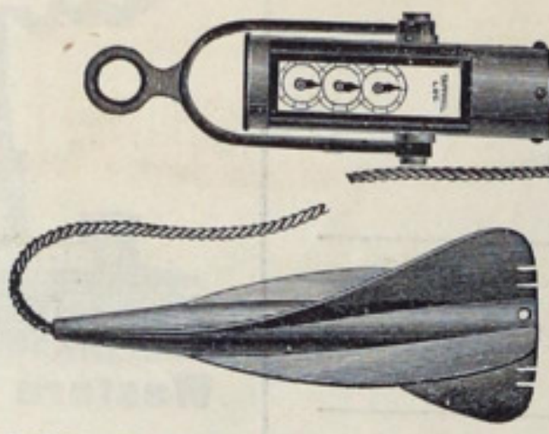
STEAMBOAT AND ENGINEERS' SUPPLIES.

All kinds of Brass Cocks, Globe Valves and Couplings, &c. Iron Pipe and Fittings, and Mill Supplies. Rubber Belting, Hose and Packing, Springs, Valves, &c. Leather Belting and Usudurian Packing.

TELEPHONE No. 68. NO. 18 OHIO STREET, BUFFALO, N. Y.

AGENT FOR LAKE CARRIERS' CYLINDER OIL.

The BLISS TAFFRAIL LOG



Over 11,000 Sold

A portion are now made to indicate Statute Miles for use on the Lakes.

Send us your old Bliss Register, and we will alter it to indicate statute miles for $3.50.

There are poorly made imitations of our rotator. Buy only the Bliss Adjustable Rotator, stamped with our name and patents. For sale by Ship Chandlers.

John Bliss & Co., 128 Front Street, NEW YORK.

MARINE VALVE OIL FOR INTERNAL LUBRICATION. RENOWN ENGINE OIL FOR EXTERNAL LUBRICATION

Marine Valve, Renown Engine, Eldorado Engine, Crank Case, Victor Signal, Dark Lubricating, Mineral Seal, Head Light, Artic Cup Greases, and Lard Oils.

— CARRIED IN STOCK AT THE —

STANDARD OIL COMPANY'S MARINE DEPOT,

TELEPHONE 77. 123 River Street, CLEVELAND, O. MAIN OFFICE TELEPHONE 682.

ALSO FOR SALE BY STANDARD OIL COMPANY, Chicago, Ill., No. 5 Wabash Ave. Racine, Wis. Milwaukee, Wis., Broadway & Mason. Sheboygan, Wis. Manitowoc, Wis. Green Bay, Wis. Marinette, Wis. Oshkosh, Wis. Duluth, Minn. West Superior, Wis. Hancock, Mich. Marquette, Mich. Buffalo, N. Y. Sault Ste. Marie, Mich. West Bay City, Mich., M.C.Ry. & 10th St Saginaw, Mich., Eighth & Sears Sts. Detroit, Mich., 46 Jefferson. Toledo, O., Summit & Monroe Sts.

ATLANTIC REFINING COMPANY, French & 16th Sts., Erie, Pa.
D. ROBERSON, Port Huron, Mich.
W. S. MCKINNON, Ashtabula Harbor, O.
HULL & RAND, Huron, O.
EDWARD BRAMMALL, Bnton Harbor, Mich.
BABY & DALE, St. Clair, Mich.
N. C. ALTEN, Lorain, O.
A. F. HARRINGTON, Conneaut Harbor, O.
A. H. MCGONAGIL, South Chicago, Ill.
MARINE SUPPLY CO., Fairport, O.
F. KRANZ, Sandusky, O.
THE M. I. WILCOX CORDAGE & SUPPLY CO., Toledo O

1897 Blue Book of American Shipping

"IS THE BEST BOOK OF THE KIND EVER PUBLISHED,"

at least that seems to be the almost universal verdict of purchasers and advertisers.

ORDER A COPY, Price $5, and if you are not satisfied with the book, we will pay express both ways and credit the $5.

BLUE BOOK OF AMERICAN SHIPPING,
409 Perry-Payne Building, CLEVELAND O.

The Coast Line to MACKINAC
TAKE THE

TO MACKINAC DETROIT PETOSKEY CHICAGO

New Steel Passenger Steamers

The Greatest Perfection yet attained in Boat Construction—Luxurious Equipment, Artistic Furnishing, Decoration and Efficient Service, insuring the highest degree of COMFORT, SPEED AND SAFETY

FOUR TRIPS PER WEEK BETWEEN

Toledo, Detroit and Mackinac

PETOSKEY, "THE SOO," MARQUETTE AND DULUTH.

LOW RATES to Picturesque Mackinac and Return, including Meals and Berths. From Cleveland, $18; from Toledo, $15; from Detroit, $13.50.

DAY AND NIGHT SERVICE.

Between Detroit and Cleveland

Connecting at Cleveland with Earliest Trains for all points East, South and Southwest and at Detroit for all points North and Northwest.

Sunday Trips June, July, August and Sept. Only.

EVERY DAY BETWEEN

Cleveland, Put-in-Bay and Toledo

Send for Illustrated Pamphlet. Address

A. A. SCHANTZ, G. P. A., DETROIT, MICH.

The Detroit & Cleveland Steam Nav. Co.

$2.50 CLEVELAND To BUFFALO

ALSO DAILY LINE BETWEEN

CLEVELAND AND TOLEDO,

Via "C. & B. LINE."

Steamers "City of Buffalo," (new) "State of Ohio" and "State of New York"

Daily, Except Sunday, Until About December 1st.

Lv. Cleveland 7:00 P.M. | Lv. Buffalo 7:30 P. M
Ar. Buffalo 7:30 A.M. | Ar. Cleveland 7:30 A. M

CENTRAL STANDARD TIME.

Take the "C. & B. Line" steamers and enjoy a refreshing night's rest when enroute to Buffalo, Niagara Falls, Toronto, New York, Boston, Albany 1,000 Islands, or any Eastern or Canadian Point.

Cheap Excursions Weekly to Niagara Falls.

Send 4 cents postage for tourist pamphlet. For further information ask your nearest Coupon Ticket Agent or address,

W. F. HERMAN, GEN'L PASS. AGT. T. F. NEWMAN, GEN'L MANAGER,
CLEVELAND, O.

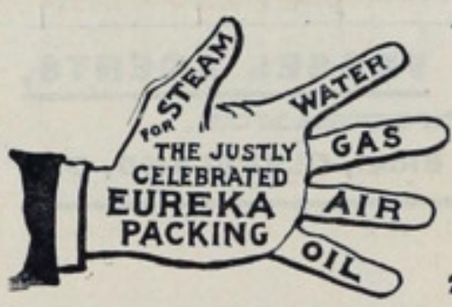
APPOINTMENTS of Captains and Engineers for 1897.

The most complete published. Arranged for reference by fleet and by vessels with names alphabetically arranged.

Necessary to everyone who has business with captains or engineers.

PRICE $1.00.

MARINE REVIEW,
409 Perry-Payne Bldg., Cleveland, O.



YOU ARE A BACK NUMBER

If you don't know how to use an INDICATOR or carry in your closet some EUREKA. Send for our catalog and easy terms of payment for INDICATOR.

JAS. L. ROBERTSON & SON,
204 Fulton St., N.Y. 12 Pearl St., Boston

EVERY MARINE ENGINEER on the Lakes, and every second who is studying for first class papers, ought to possess

Reed's Engineers' Hand Book

(Fifteenth Edition.)

Containing 600 engravings and a portfolio of drawings of all parts of marine engines.

It has always sold for $4.50 and $5. Until Dec. 1 any subscriber to the REVIEW may have a copy sent post paid by enclosing this advertisement and $4 to

Marine Review,

BOOK DEPT. 409 Perry-Payne Bldg., CLEVELAND, O.

STEAM ENGINEERING

(Stationary, Locomotive, Marine); Mechanical Drawing; Architectural Drawing; Machine Design; Electricity; Architecture; Plumbing; Railroad, Municipal, **31 COURSES** Hydraulic & Bridge Engineering; Surveying and Mapping; Metal Pattern Cutting; Bookkeeping; Shorthand; English Branches; Mining; Metal Prospect'g.

TAUGHT BY MAIL — THOROUGH — PRACTICAL

All who study **GUARANTEED SUCCESS.**

Fees Moderate, Advance or Installments.

Circular Free; State subject you wish to study.

International Correspondence Schools, Box 965 Scranton, Pa.

HARVEY D. GOULDER,
LAWYER AND PROCTOR IN ADMIRALTY,
CLEVELAND, O.

ALBERT J. GILCHRIST, PROCTOR IN ADMIRALTY,
No. 604 PERRY-PAYNE BLDG., CLEVELAND, OHIO.

AMBROSE V. POWELL, C.E., * * Consulting Engineer.
Specialties: Designing and Construction of DRY DOCKS, Harbor Works, Docks and Plants for Handling Coal and Ore.
Office, 507 Chamber of Commerce, - CHICAGO, ILL.

C. E. KREMER, *Attorney and Counselor-at-Law and Proctorin Admiralty.*
Rooms 14, 15 and 16, Bryan Block, - - 164 LA SALLE ST., CHICAGO, ILL.

HARVEY L. BROWN,
Counselor at Law and Proctor in Admiralty,
35 White Building, BUFFALO, N. Y.

HAWGOOD & MOORE — W. A. HAWGOOD, J. W. MOORE.
Vessel and Insurance Agents,
Residence Phone, Doan 446—W. A. Hawgood.
Long Distance Tel. 2395. **608 Perry-Payne Bldg., CLEVELAND, O.**

W. C. RICHARDSON,
VESSEL AND MARINE INSURANCE AGENT.
Office Telephone 338.
Residence Telephone 2938. Nos. 606 & 607 Perry-Payne Bldg., Cleveland, O.

J. H. BARTOW, TELEPHONE 717.
Vessel and Insurance Agent,
611 and 612 Perry-Payne Bldg., Cleveland, O.

JOHN MITCHELL. JOHN F. WEDOW. ALFRED MITCHELL.
MITCHELL & CO.,
Vessel and Insurance Agents,
508, 509 and 510 Perry-Payne Building, CLEVELAND, OHIO
Office Telephone, 737. Residence, John Mitchell, 3506.

C. R. JONES & CO., VESSEL AGENTS,
FIRE AND MARINE INSURANCE.
Nos. 501, 502 and 503 Perry-Payne Bldg., CLEVELAND, O.

THOS. WILSON,
MANAGING OWNER
WILSON'S TRANSIT LINE.
Gen. Forwarder.
Freight and Vessel Agent.
CLEVELAND, O.

J. T. ROSE. FRANK B. LAZIER.
ROSE & LAZIER,
Vessel Agents and Brokers, and Marine Insurance,
16 Board of Trade,
DULUTH, - - MINN.

PATENTS

Quickly secured. **OUR FEE DUE WHEN PATENT OBTAINED.** Send model, sketch or photo. with description for free report as to patentability. **48-PAGE HAND-BOOK FREE.** Contains references and full information. **WRITE FOR COPY OF OUR SPECIAL OFFER.** It is the most liberal proposition ever made by a patent attorney, and **EVERY INVENTOR SHOULD READ IT** before applying for patent. Address:

H. B. WILLSON & CO.
PATENT LAWYERS,
Le Droit Bldg., WASHINGTON, D. C.

J. J. H. Brown. Edward Smith.
J. B. Rodgers.
BROWN & Co.,
Vessel and Insurance Agents,
202 Main St.,
BUFFALO, N. Y.

White, Johnson & McCaslin,
ATTORNEYS-AT-LAW,
—AND—
Proctors in Admiralty,
26-27 Blackstone Building,
CLEVELAND, - OHIO.

ORESTES C. PINNEY,
Lawyer and Proctor in Admiralty.
Rooms 722 and 723 Perry-Payne Bldg.
CLEVELAND, OHIO.
Telephone 2585.

C. W. ELPHICKE. JAS. A. MYERS.
CALVIN CARR.
C. W. ELPHICKE & CO.
GENERAL INSURANCE AGENTS,
Room 10, No. 6 Sherman St., Chicago, Ill.

Pickands, Mather & Co.,

FUEL LIGHTERS AT BUFFALO, ERIE, ASHTABULA AND CLEVELAND.

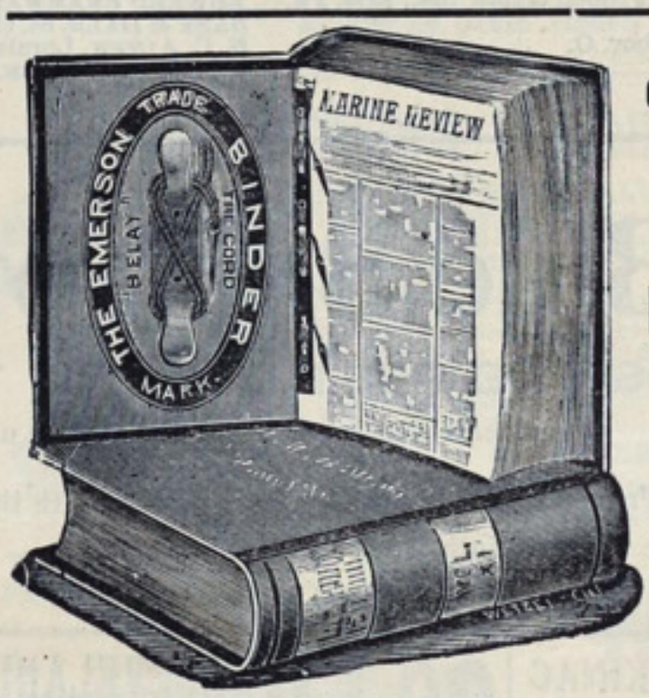
At DETOUR, MICH., A FUEL DOCK equipped with Shute capacity of 600 Tons.
Best Quality PITTSBURGH COAL furnished at any time during Day or Night.

Western Reserve Building, CLEVELAND, O.

Ohio & Pennsylvania Coal Co.

FUEL DEPARTMENT.
MINERS AND SHIPPERS,
Youghiogheny and Ohio Steam Coals. Steamboats, Tugs, etc., Coaled day or night, DOCKS FOOT WEST RIVER STREET. WHISKEY ISLAND GOVERNMENT PIER and C. & P. R. R. SLIPS. Also STEAM LIGHTER—Equipped with Revolving Derrick and (100) two ton buckets.
Telephone 1608. Office, 130 West River St., CLEVELAND, OHIO.

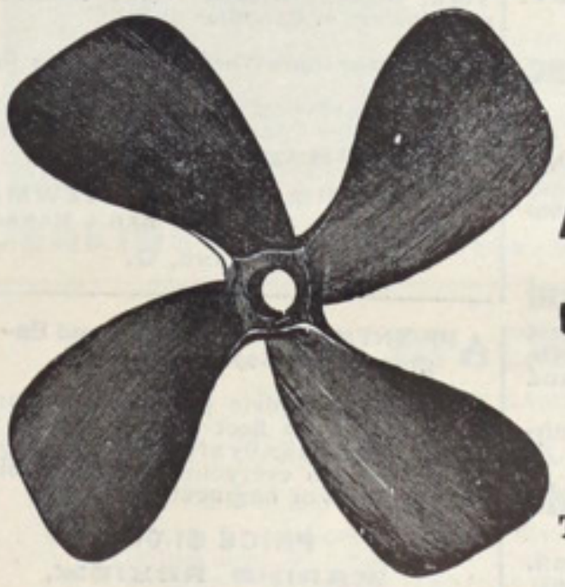
THE PITTSBURGH AND CHICAGO GAS COAL CO.
MINERS AND SHIPPERS OF
Pittsburgh and Youghiogheny Coal.
Fuel Docks West Side of Main River, Cleveland, Ohio, just above Main St. Bridge.
Latest equipment for rapid fueling of Steamers at all hours, day or night.
Fuel Lighter 300 tons capacity; buckets 2½ tons capacity.
Telephone { Office 1888. Fuel Dock 1590. Ore Dock, 2413.
J. A. DONALDSON, Agent, 420-421 Perry-Payne Building.



ONE OF THESE BINDERS
that will hold 52 NUMBERS of the
MARINE REVIEW,
Will be mailed to any address on receipt of $1.
MARINE REVIEW...
409 Perry-Payne Bldg.,
CLEVELAND, O.

H. A. BARR, PRESIDENT, Escanaba. F. H. VAN CLEVE, SEC. Escanaba. CAPT. GEO. BARTLEY, SUPT. Escanaba.
ESCANABA TOWING & WRECKING CO., Escanaba, Mich.
Tugs, Lighters, Steam Pumps, Hawsers, Hydraulic Jacks and Diving Appliances always ready.
TUG MONARCH, Engine Compound, Cylinder 16 and 30 inches diameter, 30 inch-Stroke, Steam Pressure Allowed, 125 pounds.
TUG DELTA, Cylinder 20 by 22, Steam Pressure Allowed, 105 pounds.
TUG OWEN, Cylinder 20 by 20, Steam Pressure Allowed, 104 pounds.
CENTRIFUGAL PUMPS, Seven and Fourteen Inch Suction

H. G. TROUT,
KING IRON WORKS,
BUFFALO, N. Y..
MANUFACTURERS OF
TRIPLE EXPANSION, THREE CYLINDER, FORE AND AFT And STEEPLE COMPOUND MARINE ENGINES,
High and Low Pressure Engines, Sectional. Propeller, Tug and Yacht Wheels,
Cowles Aluminum and Manganese Bronze Propeller Wheels.



These Wheels are noted for their extra speed, towing power and proportionate saving of coal.

PRICES QUOTED ON APPLICATION.

MARINE REVIEW

VOL. XVI. CLEVELAND, O., NOV. 18, 1897. No. 21.

HOWDEN HOT DRAFT

TOTAL INSTALLATIONS THROUGHOUT THE WORLD

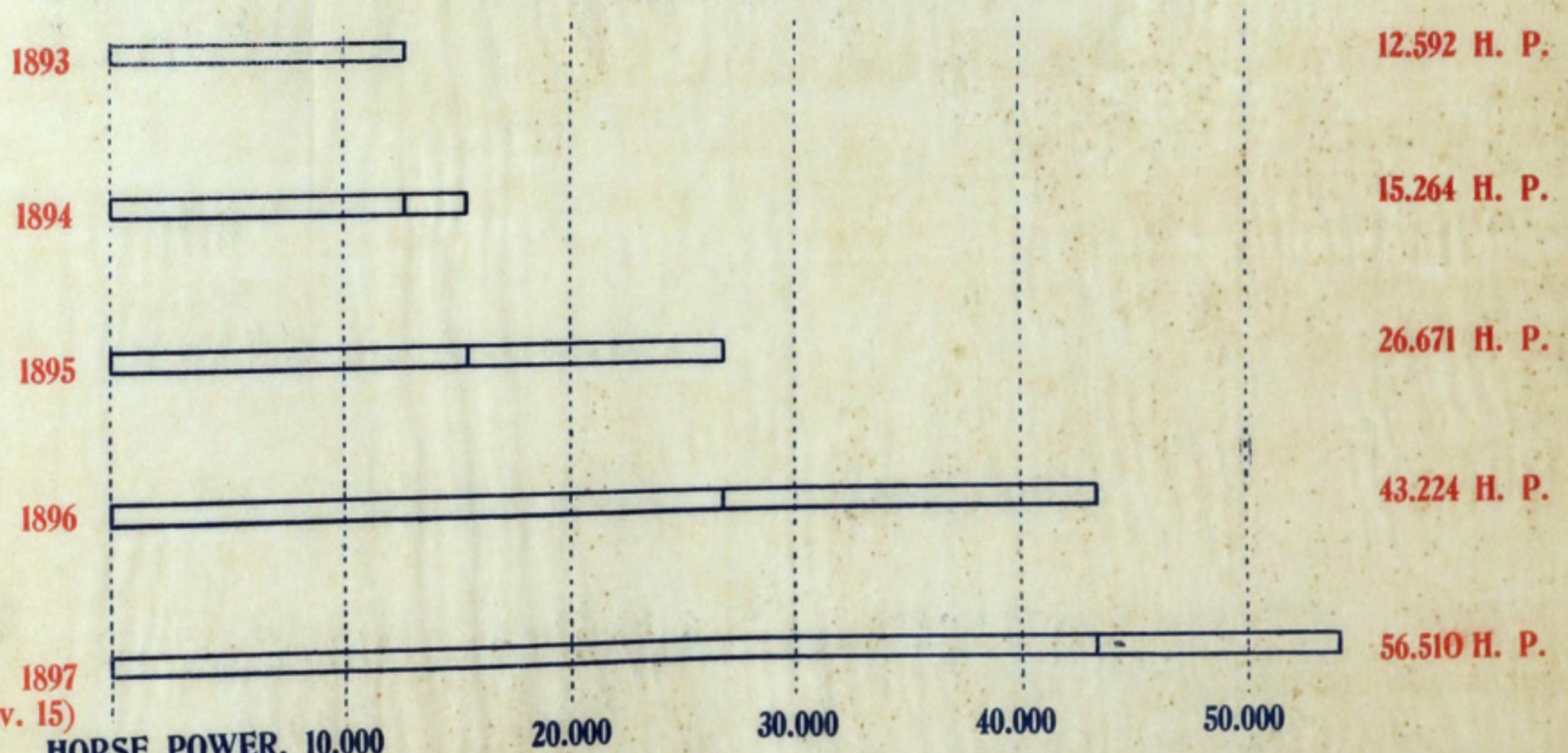
1,561,400 HORSE POWER.

TOTAL INSTALLATIONS ON THE LAKES BY THE

DRY DOCK ENGINE WORKS, DETROIT,

56,510 HORSE POWER.

Diagram showing the increase of HOWDEN equipments on the lakes for the first five years.



At this rate of increase all the principal steamers of the lake business fleet will be equipped in ten years.

Why not have the benefit of the economy of this draft next season by giving your order for an equipment now.

FREE WINTER DOCKAGE FOR STEAMERS WHOSE OWNERS CONTEMPLATE A HOWDEN EQUIPMENT.

Cable Address "RETSOF" NEW YORK

Address all business Communications to the Company

J. M. FOSTER, Pres't & Gen'l Man. — I. BAKER, Sec'y & Treas.

Long Distance TELEPHONE

The Foster Engineering Company.

Office & Factory 21 & 23 Prospect St. Newark, N.J. Sept 29, 1897

FOREIGN AGENCIES:
W.H. Bailey & Co. Ltd
LONDON
MANCHESTER
Alex Friedmann
VIENNA, PARIS
BUDAPEST

Manufacturers of
PRESSURE REGULATORS
(Reducing Valves)
and
PUMP GOVERNORS,
FOR ALL SERVICES AND PRESSURES
OF
STEAM, WATER, GAS OR AIR;
AUTOMATIC SAFETY STOP VALVES;
INSIDE SAFETY BOILER CHECKS;
AIR BRAKE PUMP GOV'S.
ETC, ETC, ETC

Standard Valve
of the
U.S. NAVY,
AND OF LEADING
SHIPBUILDERS
AND
RAILROADS.

ALSO FOR THE GENERAL INDUSTRIES IE
ELECTRIC LIGHT, POWER & TRACTION;
STEAM HEATING,
WATER WORKS,
ELEVATORS,
MINES, COLLIERIES,
PAPER MILLS,
TEXTILE MILLS,
BREWERIES,
DISTILLERIES,
REFINERIES,
CANNERIES,
RUBBER WORKS,
CHEMICAL WORKS,
DYE WORKS,
PRINT WORKS,
BLEACHERIES,
ABATTOIRS,
REFRIGERATING PLANTS
ETC, ETC, ETC

Marine Review,
409 Perry Payne Bldg.,
CLEVELAND, O.

Gentlemen:-

We are in receipt, to-day, of the 1897 "Blue Book of American Shipping", and enclose, herewith, our check for $5 for same.

Permit us to express our admiration of this book. It is not only very handsome, but very useful-- we should say indispensable to all who are in any way connected with shipbuilding interests. It is the finest modern instance we have seen of the application of the beautiful in art to business ends-- for it is not only a directory of vessels, vessel owners, vessel builders, and of the trades engaged in the manufacture and supply of ship material, but it is a beautiful marine picture gallery, as well. We cannot turn over its pages without being impressed with the great amount of labor and care necessary to the production of such a work.

Congratulating you, gentlemen, and wishing for this book the very large circulation it merits, we beg to remain.

Yours truly,

Foster Engineering Co.,
J. N. Baker Sec'y & Treas.

The Erie & Western Transportation Company
Office of the President

Frank J. Firth, President — Philadelphia, October 1st, 1897.

The Marine Review,
Cleveland, Ohio.

Gentlemen:-

Yours of July 21st, with the 1897 Blue Book of American Shipping sent on approval, arrived here during my absence. Our Auditor will to-day remit you the $5. due for the book, which is certainly a very creditable and interesting publication.

Yours truly,

Frank J. Firth
President.

ALFRED WINSOR & SON. SHIP BROKERS. BOSTON.

Boston, Mass., Aug. 9, 1897.

Gentlemen:

Your favor of Aug. 5th received. We will take one of the Blue Books at the price named and we are only too glad to be able to help you out in this matter, and trust all the ship brokers and owners will contribute their share to this matter. It is something we cannot afford to let die out.

Yours truly,
Alfred Winsor & Son
by Secretary

BLUE BOOK OF AMERICAN SHIPPING

The only advertising medium that reaches all the Marine interests of the United States.

Its lists are used by the principal concerns of the United States who circularize the Marine trade.

The only book of its kind.

"London Engineering" says it is to American shipping what Lloyd's register is to British shipping. No marine business concern can afford to be without it.

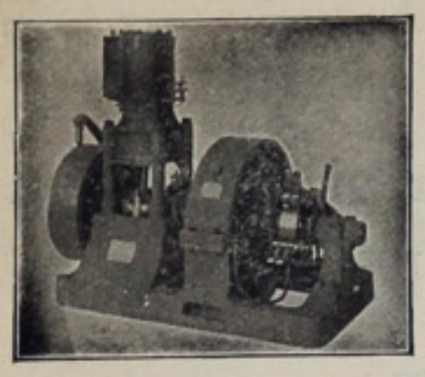
Order the 1898 edition now and have your firm included in the classified directory, used by purchasing agents of ship owning and ship building concerns.

Copy of the book, $5.00. Advertising rates on application.

BLUE BOOK OF AMERICAN SHIPPING

409 Perry-Payne Building,

CLEVELAND, O.



Complete Electric Plants for Light and Power

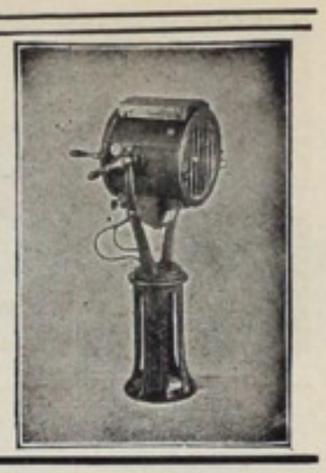
On STEAMSHIPS, WHALEBACKS, YACHTS, DOCKS, WHARVES, Etc.

Our system is complete in every detail. All our appliances are made to Governmental and Insurance requirements and are perfect. Write for prices and catalogues.

General Electric Company.

SALES OFFICES

Schenectady, N. Y. Chicago, Ill. Detroit, Mich. Buffalo, N. Y. Columbus, O.
Boston, Mass. Philadelphia, Pa. Baltimore, Md. Portland, Ore. San Francisco, Cal.
New York, N. Y. New Orleans, La.



FRONTIER IRON WORKS

MARINE ENGINES,
DETROIT, MICH.

10,000 IN USE.

Unaffected bv Weather.

Portable, Self Contained.

800 to 4000 Candle Power from KEROSENE OIL.

Especially adapted for Contractors, Quarries, Shovels, Railroad Construction, Dredges, Bridge and Dock Builders, Water-Works, Brick Yards and Coal Docks.

400 RAILROADS and over **500** CONTRACTORS now use the WELLS LIGHT.

The Wells Light Mfg. Co.

EDWARD ROBINSON, Sole Proprietor.

46 Washington Street, NEW YORK.

THE BETHLEHEM IRON CO.

Works & Principal Office, **South Bethlehem, Penn.**

Marine Engine Forgings

of all descriptions, made either SOLID or HOLLOW from Fluid-Compressed Hydraulic-Forged Open Hearth Steel.

Ship-Plates. Boiler-Plates. Tank-Plates.

NEW YORK OFFICE, - - 100 Broadway.
PHILADELPHIA OFFICE, - 421 Chestnut St.
CHICAGO OFFICE, - - Marquette Bldg.

THE W. L. SCOTT CO.

Wholesale Dealers in

Shamokin, Wilkesbarre, and Hazleton-Lehigh

COALS.

Mansfield Steam Coal.

FUELING VESSELS a specialty, either from dock or steam scow **Mansfield**, capacity 300 tons, in buckets, which gives quick dispatch. Boats coaled day or night. Docks lighted with electricity and equipped with steam derricks.

Fueling Office at Canal Dock, ERIE, PA.

Cuddy-Mullen Coal Co.

Miners and Shippers of Steam Coal

FUELING DEPARTMENT FACILITIES:

CLEVELAND HARBOR—
Car Dumper; Eight Pockets 1,000 tons capacity; Three Steam Derricks; Lighter.

DETROIT RIVER BRANCH—
Amherstburg, Four Pockets and Three Steam Derricks; Sandwich, Ten Pockets and Two Steam Derricks.

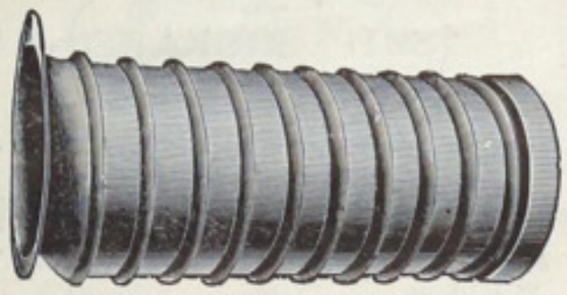
SAULT RIVER BRANCH—
Two Docks at Detour (formerly known as the Anthony and Watson Docks) Equipped with Pockets and Steam Derricks.

Good Coal; Courteous Attention; Quick Dispatch.

General Offices: Perry-Payne Bldg., Cleveland, O.

PURVES' RIBBED STEEL BOILER FURNACE FLUE.

BACK END.



FRONT END.

With this style of Furnace Flue, the rivets at the "back end" are out of the line of fire, and all that has to be done to remove it is to cut out the rivets at the ends and slip it through the front; and to replace it, simply to slip it back in its place and rivet up the ends again without disturbing any other part of the boiler. No smith work is required to fit it in a boiler or to refit it when replaced. It is ready for use as it comes from the manufacturers. This style of Flue has been in use six years without a single complaint.

Over 16,000 of Purves' Ribbed Steel Furnace Flues in successful use in Marine Boilers.

ELLIS & EAVES SYSTEM OF INDUCED OR SUCTION DRAFT.

CHARLES W. WHITNEY,

Sole Agent for the United States and Canada,
Bowling Green Building, 5 to 11 Broadway, New York City.

S. F. HODGE & CO.

MARINE ENGINES,
PROPELLER WHEELS,
DECK HOISTERS,
MARINE REPAIRS.

320 ATWATER STREET,
DETROIT, MICH.

THE BABCOCK & WILCOX CO.

29 CORTLAND STREET,
NEW YORK.

FORGED STEEL WATER-TUBE MARINE BOILER,

Light, durable, easily cleaned and inspected. Only straight tubes are used.
The largest cargoes on the Lakes are carried by steamers using BABCOCK & WILCOX boilers.
The fastest of the six composite Gunboats recently constructed for the U. S. N. (MARIETTA and ANNAPOLIS) are equipped with these boilers.
Boilers also ordered for U. S. N. CHICAGO and ATLANTA.

BAR IRON — THE BOURNE-FULLER CO. — PIG IRON

CLEVELAND, O.

SHIP PLATES, BOILER PLATES,
ANGLES, BEAMS, CHANNELS, BARS,
BOAT SPIKES, CLINCH RINGS,

SALES AGENTS:

THE CAMBRIA IRON CO.

Mfrs. of Open Hearth and Bessemer Steel.

De Grauw, Aymar & Co.,
34-35 South Street,
NEW YORK, N. Y.

Sole Selling Agents in the United States for

TYZACK'S
STOCKLESS ANCHORS

Over 100 of these Anchors on Lake Vessels.

DETROIT SHEET METAL AND BRASS WORKS

No. 64-66-68-70-72 ORLEANS STREET, DETROIT, MICH.

Jobbers of..... Pipe, Valves, Fittings. Pack ng, Oil and Engineers Suplies.

Contractors for High Class Steam Fitting, Steam Heating, Plumbing, Copper Work, and all Classes of Sheet Metal Work.

Manufacturers of Clark's Patent Metallic Life Raft, Side Lights, Marine Hardware, Hurricane, Cabin and Platform Lamps, Trip Gongs, etc.

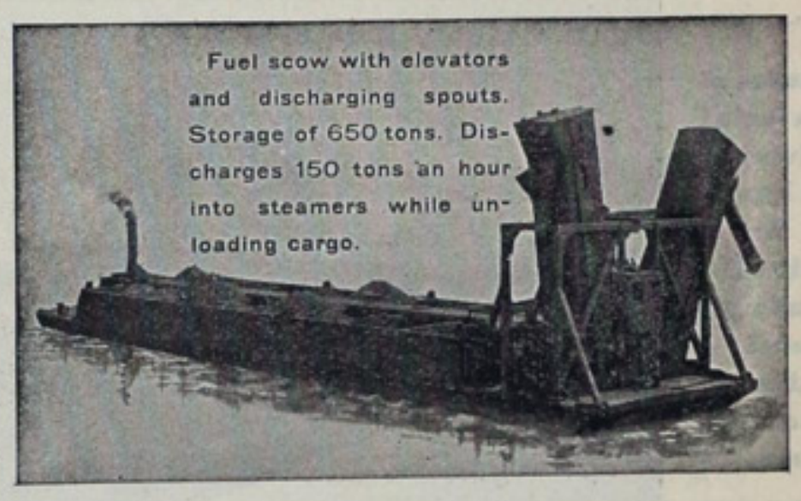
Agents for..... Laidlaw-Dunn-Gordon Steam Pumps, Warren Webster's Specialties, and Buffalo Forge Co.'s Fans, Engines and Heaters.

Engineers can be waited on promptly day or night.

Steamboat Fuel at Ashtabula.

Large Supplies of Best Quality.

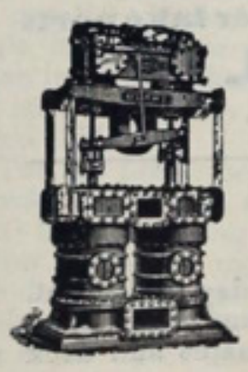
Lighter Carrying Different Grades at all Times.


Fuel scow with elevators and discharging spouts. Storage of 650 tons. Discharges 150 tons an hour into steamers while unloading cargo.

M. A. HANNA & CO.,

Main Office, Perry-Payne Bldg., Cleveland. Miners and Shippers.

THE GEO. F. BLAKE MFG. CO.



AIR PUMP ON U.S. CRUISER NEW YORK.

BUILDERS OF

MARINE PUMPS

Single and Duplex Pumps for Boiler Feed, Fire or Bilge Service—Vertical and Horizontal.
Vertical and Horizontal Pumps, Air Pumps for Surface and Jet Condensers.

95 and 97 Liberty St., NEW YORK.

PEERLESS RUBBER MFG. CO.

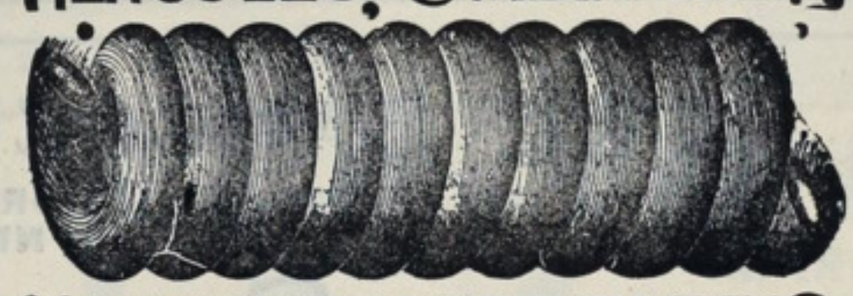
16 Warren Street, NEW YORK.

ALWAYS TIGHT. — LEAVES THE STEM CLEAN.

MADE BOTH STRAIGHT AND SPIRAL.

PUT UP IN BOXES.

HERCULES COMBINATION



METALLIC STOP VALVE PACKING

WRITE US FOR TESTIMONIALS.

16-24 Woodward Avenue, DETROIT, MICH.

193-195 Bank Street, CLEVELAND, O.

202-210 S. Water Street, CHICAGO, ILL.

The Cleveland Dry Dock Co.

148 Elm St., Cleveland, O.

Telephone 1616.
Resid. 'Phone 3634.

REPAIRING A SPECIALTY.

Dimensions of Dock:

Lth. over all, 360 ft.
Lth. on blocks, 340 ft.
Width of gate, 50 ft.
Depth over sill, 20 ft.

Capt. W. W. BROWN, Sec'y & Mgr.

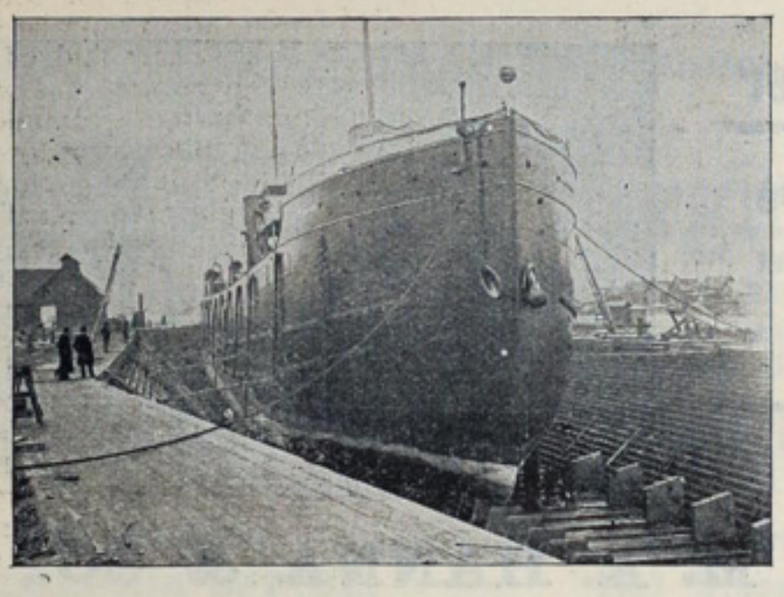
AMERICAN STEEL BARGE CO.

STEEL and METAL SHIPS

Of all classes built on the Shortest Possible Notice at our yards at

West Superior, Wis., and also at Everett, Wash.

Plates & Material Always on hand to Repair all kinds of Metal Ships in Shortest Time.



Best Quality of Oak instock for Repairing Wooden Vessels of all Classes.

SIZE OF DOCK.

Length, extreme	537 feet.	Entrance, Top	55 feet 9 in
Breadth, Top	90 " 4 in.	Entrance, Bottom	50 "
Breadth, Bottom	52 "	Depth over Sills	18 "

LARGEST DRY DOCK ON THE LAKES.

Prices for Repairs and Docking same as at lower lake ports

SUPERIOR, WIS.

A number of Propellor Wheels in stock at Dry Dock.

H. C. BURRELL

MARINE REPORTER, DETROIT.

Small boat on the river at all hours of the day and night. Let us give you prices on delivery of orders and other business at Detroit. Engineers and firemen, mates and deck hands, furnished on short notice.

Office Foot of Woodward Ave.

COAL

STANLEY B SMITH & CO. OPERATING SMITH'S COAL DOCK, POCKET FUELING AND LOW DOCK, DETROIT, MICH. OFFICES: DETROIT MICH. LORAIN, OHIO. OPERATING LORAIN COAL DOCK. LAKE SHIPPERS OF STEAM COAL. STEAMBOAT FUELING

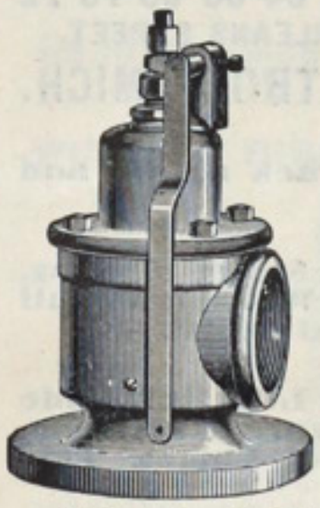
DELTA METAL

REG TRADE MARKS "Phosphor-Bronze" DELTA

THE PHOSPHOR BRONZE SMELTING CO. LIMITED, 2200 WASHINGTON AVE., PHILADELPHIA.
"ELEPHANT BRAND PHOSPHOR-BRONZE"
INGOTS, CASTINGS, WIRE RODS, SHEETS, ETC.
— DELTA METAL —
CASTINGS. STAMPINGS AND FORGINGS.
ORIGINAL AND SOLE MAKERS IN THE U.S.

PROPELLERS.

CROSBY STEAM GAGE AND VALVE CO.



CROSBY POP SAFETY VALVES. Locomotive, Marine and Stationery.
CROSBY WATER RELIEF VALVES, for Pumps, Hydrants, etc.
CROSBY IMPROVED STEAM PRESSURE GAGES.
CROSBY STEAM ENGINE INDICATORS, with Sargent's Electrical Attachment for taking any number of Diagrams simultaneously.

The Original SINGLE BELL CHIME WHISTLES.
BRANDEN PUMP VALVES; rubber with wire-coil insertion.
BOSWORTH FEED-WATER REGULATOR, PATENT GAGE TESTER, and many other specialties in Steam Lines.

Main Office and Works: Boston, Mass.

Stores: Boston, New York, Chicago, and London, Eng.

WE WILL REPAIR YOUR STEAM FITTINGS PROMPTLY.

ALL RELIABLE statistics relating to shipping are contained in the Blue Book of American Shipping. Price, $5. MARINE REVIEW, Cleveland.